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INDEX.

Original Contributions are marked with an asterisk.

A

B

M

N

O

S

T

U

V

W

X

CONICAL ASTIGMATISM, AND STAPHYLO-
MATA OF THE SCLEROTIC AS A CAUSE
OF ASTIGMATISM.

By Rayner D. Batten, M.D., B.S.Lond.
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In a former paper (Ophthalmic Review, April, 1894) I called attention to the distortion of the retinal vessels as an aid to the diagnosis of the locality of staphylomata, when occurring in the posterior portion of the globe. I now wish to call attention to the diagnosis of staphylomata occurring laterally, or in the anterior portion of the globe.

Staphylomata or general yielding of the globe anteriorly do not necessarily give rise to the evidences usually associated with yielding of the sclerotic, viz., refractive myopia, myopic crescents, thinning of the choroid, stretching and distortion of the retinal vessels. Yielding of the sclerotic in the anterior portion of the globe can be frequently well seen by simple examination of such portion of the external surface as can be rendered visible by retraction of the lids, combined with extreme lateral and vertical movements of the eye, which will also reveal any distortion of the globe, either by a localised staphyloma, or by lateral yielding of the sclerotic. The thinning of the sclerotic can be detected by its bluish colour and its greater translucency to focal light.

In many cases of high astigmatism, the lateral yielding of the sclerotic is extremely well marked, giving

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I

rise to a flattened appearance at the upper portion of the globe, and a distinct thinning at the external side.

Astigmatism has of course been abundantly proved to be directly caused by differences of curvature of the cornea. But this distortion of the cornea is, I believe, generally secondary to the yielding of the sclerotic at some other portion of the globe. In a more or less elastic sphere, such as the eye-ball, dependent in part for its shape on internal pressure, distortion of any one portion of the globe cannot take place without affecting the shape of the rest of the globe. Consequently, if the sclerotic yields laterally, the curvature of the cornea becomes flattened in that direction, and when from any cause a portion of the globe becomes softened, and yields, it not only forms a cone at that spot, but the rest of the globe in the immediate neighbourhood also becomes more or less conical, and the whole globe becomes egg-shaped, with the little end at the point of greatest yielding. This is typically seen in cases of conical corneæ, but it also occurs in other forms of staphylomata, occurring at any portion of the globe.

In estimating refractions by the shadow-test, I have occasionally come across cases of astigmatism, in which the shadows on the opposite sides of the cornea are not parallel, but are inclined to each other (as shown in diagram), and in which the shadows in the opposite axis appear to be of different values on either side of the cornea. The degree of inclination of the shadows

has varied, and the shadows converge towards the staphyloma. The possible explanation of these cases has puzzled me for some time, but lately I have had an opportunity of observing some cases which I think have furnished an explanation. They are in fact cases of conical astigmatism, that is to say, cases in which, a staphyloma having occurred in the near neighbourhood of the cornea, the eye becomes conical, with its apex at the staphyloma, and the cornea is involved in the side of the cone, its surface being distorted *conically*, and not cylindrically (as in ordinary astigmatism).

The two cases in which I have recently observed this condition were both of acute onset. In one of them there was a wound of the sclerotic, about 3 mm. from the margin of the cornea, which divided the sclerotic completely for about 2 mm. The conjunctiva was stitched over the wound, and the wound healed, leaving, however, a weak spot in the sclerotic, which yielded and gave rise to the conical condition above described. The outline of the cornea in this case became distorted, and images of straight objects reflected in the cornea appeared curved. The retinoscopy shadows were hypermetropic in the horizontal meridian, and myopic in the two converging meridians.

The second case was one of localised episcleritis, in which a staphyloma formed as the inflammation subsided, and gave rise to a similar conical condition.

The condition is by no means a common one, and its importance lies chiefly in the light which it throws upon the causation of some other forms of astigmatism. It shows that a yielding of the sclerotic affects the curvature of the cornea, and in many cases of high, simple, or mixed astigmatism, I have found the lateral portion of the sclerotic considerably stretched and thinned, and on ophthalmoscopic examination that portion of the fundus proves to be more highly myopic than the rest of the fundus.

In some cases, where there is evidence of old corneal mischief, the astigmatism is irregular, and the shadows assume somewhat the same triangular arrangement as in cases of conical astigmatism, though probably due to another cause. In cases of conical astigmatism, the cornea is clear and the retinoscopy shadows are distinct and definite.

In conclusion, the points I wish to emphasise are (1) That in most cases of astigmatism, there is evidence of yielding of the sclerotic at some portion of the globe, and the corneal astigmatism is secondary. (2) That where the astigmatism is very high, the yielding of the sclerotic is chiefly lateral and localised. (3) That in cases of conical astigmatism a staphyloma is to be found in the immediate neighbourhood of the cornea.

A NEW METHOD OF MOUNTING OPHTHALMIC SPECIMENS.

By PRIESTLEY SMITH.

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THE use of glycerine jelly as a means of mounting ophthalmic specimens [1] has certain drawbacks. The steps by which the tissues are gradually impregnated with glycerine in order to avoid shrinking are rather troublesome, the glycerine considerably lessens the sharp definition of the tissues by rendering them transparent, and the specimen when mounted is no

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[1] See OPHTH. REVIEW, vol. ii., p. 69, 1883.

longer available for microscopic sections, should such
be desired.   Moreover it is by no means easy to obtain
a   perfectly transparent, colourless, and permanent
jelly.   Formalin solution, which has proved such an
excellent hardening agent, is also a good preservative,[1]
and it occurred to me lately that if it were possible to
mount specimens permanently in this fluid, fixing and
displaying them properly in an inverted jar as at
present, but without the aid of glycerine jelly, much
time and trouble would be saved.   One or two trials
showed that this can be done by means of a suitable
glass jar, a perforated rubber bung, and a short glass
rod which plugs the hole in the latter and holds the
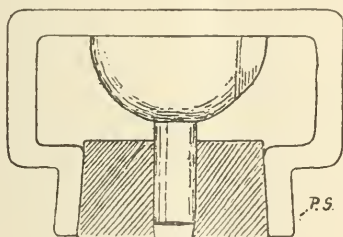
specimen in place, as shown in the accompanying
illustration.   In this way the whole process of mount-
ing an eye for demonstration becomes simple and
expeditious.   As regards hardening and cutting, I have
nothing new to propose, but for those who have not
already done any work of the kind it may be con-
venient to have a brief account of the whole process
here.

   The fluid employed is a 10 per cent. solution of
formalin, *i.e.*, one part of " formalin" as sold in the

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[1] Leber, *Trans. Internat. Ophth. Cong.*, Edinburgh, 1894, p. 132.

shops, to nine parts of water. That which is used for permanently mounting the specimens should be made with water which has been recently boiled and cooled, in order that it may contain no air, for if this precaution be neglected air bubbles will soon make their appearance in the jar.

The eyeball having been freed from all loose tissue external to the sclera—of which there should be extremely little after a well-performed excision—is placed at once in formalin solution ; there it must remain at least twenty-four hours, and *may* remain any length of time. It is then ready for freezing and division.

After drying with a cloth, the surface of the globe is carefully marked at three or four points with pen and ink to show the exact direction which the section is to take, usually a horizontal plane passing through the centres of the cornea and optic nerve. It is then wrapped in thin gutta-percha membrane, or placed in a suitable metal box, and frozen solid by immersion for about an hour in an earthen vessel filled with a mixture of pounded ice and salt. It is then divided in the required direction by means of a sharp thin knife and returned to the formalin solution. Either half, or both, may now be mounted without further preparation.

A jar is completely filled with de-ærated formalin solution ; the half eye is placed in it, the cut surface downwards, without inclusion of air bubbles ; the bung, well wetted with the solution to prevent adhesion of air, is pushed firmly in, the fluid welling up through the hole ; and, lastly, the hole being completely filled with fluid, the glass rod is pushed in until its inner end presses against the back of the specimen.

For the safe keeping of such specimens in a drawer, a board perforated with holes to receive the necks of the jars answers well.

The advantages of the method are that a specimen

can be prepared for demonstration within a day or two after the eye is removed ; that it can be subsequently unmounted and used for the preparation of microscopic sections at any time ; and that it can be seen in the clear colourless fluid with a sharpness of definition quite unattainable in glycerine jelly.

The difficulties, if any, will probably be connected with the fixation of the specimen and the exclusion of air. The specimen, as a whole, appears to be very satisfactorily fixed by the glass rod, but it may possibly be well in some cases to obtain more points of support by using a bung with two or even three apertures, and a rod in each. The internal parts of the eye, such as the lens or a detached retina, have of course no solid support, and where such support is needed it would be necessary to revert to glycerine jelly, the best form being that made with formalin instead of carbolic acid.[1] As regards permanency it is too soon to speak positively, but it seems likely that the difficulty of excluding air has been sufficiently overcome, and that, at least for a long time, the rubber will not be damaged by the solution.

Unmounting a specimen presents no difficulty if the bung has been left projecting ; if it has been pushed in, as shown in the illustration, it can be removed with the help of a strabismus hook inserted between the rubber and the jar.

Messrs. Osler, of Broad Street, Birmingham, the makers of the jars hitherto used for mounting in glycerine jelly, are now making jars suitable for the new method.

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[1] Devereux Marshall, " Report of Ophth. Soc.," *British Medical Journal*, Nov. 24, 1896.

REPORT OF THE TWENTY-FIFTH MEETING OF THE OPHTHALMOLOGICAL SOCIETY AT HEIDELBERG. *Wiesbaden, J. F. Bergmann.*

A. NIEDEN (Bochum). *Employment of the " Emmerich-Scholl " Cancer Serum, and Formol in Tumours which cannot be surgically removed.*—The author records two cases of sarcoma, which were treated with cancer serum without any benefit whatever. In the second case the fœtor and hæmorrhage from the ulcerated tumour were successfully combated by application of 40 per cent. formol. The size of the tumour also became less under the treatment, but the case terminated in death.

C. HESS (Marburg). *A hitherto Unobserved Displacement of the Crystalline Lens in Accommodation.*—By observing the entoptic spectrum of his own lens, Hess has been able to ascertain that the lens sinks downwards during accommodation, and that this downward displacement is caused by the slackness of the zonular fibres is proved by the observation that the direction of the displacement is influenced by gravity. The displacement is to the right or left according as the head is inclined to the right or left respectively, and if the observer stands on his head the displacement is towards the then lowest portion of the zonula. If the head be bent forward so that the plane of the iris lies horizontally no lateral displacement occurs. The displacement described has been calculated by Hess to equal $\frac{1}{5}$ to $\frac{1}{4}$ mm. Under eserine the displacement is even more easily observed, and the lens can be seen to move always towards whatever part of the zonula lies lowest.

Hess also investigated the position of the lens in accommodation with the eye looking downward or upward, and was able to make out that it became displaced there also towards the cornea, or the vitreous respectively. In normal accommodation this displacement amounts to 0·15 mm. Under eserine it equals 0·2 mm. to 0·25 mm. The evidence for this displacement depends upon the position of the near point, and the optical effect produced by shifting the lens backwards or forwards.

A. CRZELLITZER (Heidelberg). *Effect of Zonular Tension on the Shape of the Lens*.—In direct opposition to Hess, Crzellitzer ascribes the changes in shape of the lens in accommodation to tension of the zonula, as advocated by Tscherning. Starting from the theory that the peripheral portion of the lens surface becomes flatter, while the centre becomes more curved, he has experimented on the lenses of animals to ascertain what alteration in shape is produced by tension on the zonula.

The zonular tension can be increased while the lens is *in situ*, either by increasing the pressure in the vitreous or lessening the pressure in the aqueous, and by both methods the characteristic alteration in the curve of the lens surface can be produced. Further, if the lens and zonula be removed from the eye and inserted into a ring which can be enlarged so as to drag upon the zonula fibres, the same effect is produced.

In order to facilitate the comprehension of how such an effect could be produced by increased zonular tension, Crzellitzer suggests that the drag upon the periphery may cause the softer cortical substance to recede as it were from the harder and more curved nucleus at the anterior pole, and thus to increase the curvature at the pole while it is diminished at the periphery.

In the above paper, Hess replies that the direction and the amount of the pull upon the zonula in these experiments may not be the same as in the human eye, and that in any case the physiological conditions may be very different in the eyes of other mammals from what they are in the human eye.

E. VON HIPPEL (Heidelberg). *Degeneration of Retina from Fragments of Iron*.—In an eye which had to be enucleated thirteen years after injury, von Hippel found the lens absorbed, the retina *in situ*, the vitreous shrunken, and three splinters of iron. Microscopically the retina was seen to be in a state of complete degeneration, the appearances having a close resemblance to what is found in retinitis pigmentosa. The case shows that the presence of iron in an eye may lead to complete degeneration of the

retina without any detachment. Von Hippel has collected from the publications of other observers, fifty-one cases where particles of iron remained for a long period in eyes, and concludes that the presence of a piece of iron in the posterior portion of the globe may lead to blindness, after a long interval of time in four ways : (1) by shrinking of the vitreous and detachment of the retina ; (2) by acute inflammation ; (3) by a localised affection of the macula ; (4) by complete degeneration of the retina without detachment. The fatal result is delayed if the foreign body happens to be encapsuled. As an early symptom of retinal degeneration, von Hippel lays stress upon the presence of hemeralopia, by which he understands night blindness.

In the discussion on von Hippel's paper, Vossius mentioned that he had seen one case in which retinal degeneration certainly preceded " hemeralopia."

W. GOLDZIEHER (Budapest). *Retinitis Proliferans.*—Most authorities since Manz, ascribe the newly formed connective tissue in this disease to a primary affection of the retinal blood vessels and to retinal hæmorrhages. Against this theory may be urged that the hæmorrhages may well be the result and not the cause of the affection, and Goldzieher records here two cases of typical retinitis proliferans, which he has observed and in which there was never any appearance of disease of blood vessels nor any hæmorrhages. He also calls attention to the fact that retinal hæmorrhages are frequent enough without retinitis proliferans.

Goldzieher regards the pathological changes in this affection as quite distinct from those seen after severe injuries to the globe, and in syphilitic persons. He describes the disease as a peculiar circumscribed new formation proceeding from Müller's fibres, producing thickenings of, and deposits upon the internal limiting membrane, and forming vitreous membranes in the vitreous.

An affection of the blood vessels (hyaline degeneration) is secondary to the actual retinitis proliferans.

W. GOLDZIEHER (Budapest). *Hutchinson's Disease of the Fundus.*—The disease here treated of is regarded by

Goldzieher as identical with retinitis circinata as described by Fuchs. Goldzieher has seen nine cases (Fuchs twelve, and De Wecker fifteen). It is characterised by white spots of various size round the macula (the fovea being intact), no pigment ring surrounding the spots, the disc normal. Retinal hæmorrhages occurred in every case, and the patients were all old people with atheromatous arteries. The disease is to be regarded as due to defects in the retinal circulation, the result of arterio-sclerosis, but Goldzieher does not follow De Wecker in attributing the white spots to antecedent hæmorrhages.

AUG. SIEGRIST (Basel). *On a little known Disease of Retina due to Vascular Lesion.*—The case described here has already been recorded by Weltert as " retinitis circinata." The patient was a girl aged 14, who suffered from mitral valve disease, and marked general cardiac weakness. The changes in the fundus when first seen by Siegrist were not identical with those observed in retinitis circinata. They consisted of a whitish deposit in the macular region from which radiating streaks proceeded in all directions, chiefly towards the disc. The papilla was moderately congested, its borders slightly obscured, and its lower half swollen.

White spots were visible both in the temporal quadrant about two discs' breadth from the macula, and also to the nasal side of the disc. In the upper temporal quadrant a bluish white region was present with numerous ecchy-moses. The various changes which occurred in the appear-ances in the course of treatment were described, and the description elucidated by drawings shown at the meeting.

Siegrist regards the case as distinctly different from retinitis circinata, with which it has been erroneously iden-tified by Weltert. It is also not to be confounded with the fatty or white degeneration described by De Wecker. It is probably the result of vascular disturbance, possibly of a thrombotic nature, and the white appearance seen in the macular region is to be regarded as the outcome of an œdema due to disease of the capillaries in that region.

Mellinger stated in the subsequent discussion that he had seen the patient during nearly a whole year before

she came under Siegrist's care. All that time the heart was sound and the ophthalmoscopic appearances unchanged, though the vision rose after inunction from $\frac{12}{200}$ to 1, and the field of vision became normal.

Leber stated that in his opinion the white spots observed could not be produced by œdema, but might probably be the effect of the presence of cells in a state of fatty degeneration.

H. SCHMIDT - RIMPLER (Göttingen). *Atrophy of the Macular Fibres in Diabetes*.—See page 25.

M. STRAUB (Amsterdam). *Hyalitis and True Uveitis*.— The aggregation of leucocytes in the capillary layer of the choroid produced by injecting various inflammatory micro-organisms into the vitreous, is not, Straub asserts, to be termed uveitis. It is merely the sign of hyalitis as the similar collection of leucocytes in the circumcorneal vessels, is the sign of a keratitis.

True uveitis is not so easily produced experimentally, but Straub exhibited three eyes with normal vitreous and retina, and the choroid densely infiltrated with leucocytes.

R. GREEFF (Berlin). *Pseudoglioma*. — See vol. xv. (December 1896), page 358.

J. HIRSCHBERG (Berlin). *Carcinoma Spongiosum of the Iris*.—The tumour lay on the posterior surface of the iris, and consisted essentially of epithelial cells arranged in strings and tubes without any demonstrable intervening connective tissue. Hirschberg regards the tumour as springing from the retinal portion of the iris, *i.e.*, the posterior layer of pigmented cells.

H. SATTLER (Leipzig). *Elastic Fibres of the Sclerotic*.— Sattler described these fibres and exhibited microscopic preparations.

H. VON HOFFMANN (Baden-Baden). *Extirpation of the Lacrymal Sac*.—The operation is done under cocaine anæsthesia. The solution is not injected into the sac alone, but also hypodermically into the surrounding connective tissue above and below the sac. By this means the dissection is rendered easy and nearly painless.

O. SCHIRMER (Greifsvald). *Radical Cure of Choroidal*

Staphyloma. — Schirmer has obtained good results from operating in these cases. His principles are : (1) excision of the whole staphyloma, its tissue is too thin to support sutures ; (2) removal of sufficient vitreous ; (3) placing the incision so that the scleral wound can be thoroughly covered with sound conjunctiva.

AXENFELD (Breslau), records *an Epidemic of Pneumococcus Conjunctivitis in a School*, near Breslau.

TH. LEBER (Heidelberg). *Pathology of Trachoma.* — While the cause of trachoma is yet undiscovered, and the bacteriologists are still vainly working at unsuccessful cultures, we may usefully study the disease from the histological standpoint. This is what Leber has been doing, and he here records briefly the principal observations he has made, Firstly the occurrence of large cells containing peculiarly little bodies ; these are the cells described by Villard as phagocytes, but Leber prefers to call them by the indifferent term " körperchenzellen." They are to be found constantly and in large numbers in the interior of the trachoma follicles. Besides the granules they contain a large faintly stained nucleus, less deeply stained than the granules, which stain briskly with various reagents. This applies only to a portion of the granule. The other part can be brought out by different reagents, otherwise it may be overlooked.

At first Leber thought that these bodies might be the long sought for microbes of trachoma, but when he found them to be a normal constituent of the follicles in rabbits' conjunctiva, he had to give up this theory.

These " körperchenzellen " in the lymph follicles of the conjunctiva and of trachoma, seem to be of the same nature as the cells, which Heidenhain has described in the intestinal mucosa, and Hoyer in the lymph glands as phagocytes. Leber does not like to convict himself (like Villard) definitely to this view of the cells in question, but he admits that his observations tend to support the theory which regards the trachoma bodies as newly found lymph follicles.

A close connection between the trachoma bodies and the lymph vessels must be admitted, as Leber, like other

observers, has found the subjacent tissue containing numerous large lymph vessels which are thickly packed with uninuclear leucocytes. The similarity of their contents suggests the belief that they communicate directly with the lymph follicles, and this has been proved by Villard for the normal conjunctiva of the rabbit. It has not been proved for trachoma follicles.

Leber finds evidence of degenerative changes in the cells of the trachoma follicles, in which his observations are opposed to those of Villard. A peculiar appearance is to be seen in the numerous uninuclear cells, which are found in the mucous membrane surrounding the trachoma follicle. The nucleus is pushed towards one side of the cell, and the surrounding protoplasm stains more deeply, while the rest of the protoplasm stains but slightly or not at all. A sort of crescent shaped figure results (especially under low powers), and Leber therefore, terms these cells, crescent cells (Halbmond Zellen); these are not epithelial cells. Two other observations are noted, viz., (1) a dark staining of the superficial flat epithelial cells by nuclear reagents, and a mahogany brown amyloid-like staining of many of the same cells with iodine ; and (2) the occurrence of large cells in the deeper parts of the tissue, which often possess processes, and certain numerous granules which stain a reddish violet with methylin blue or thionin, while the nucleus takes a bluish stain.

In the discussion, Schmidt - Rimpler stated that as regards the etiology of trachoma his own numerous bacteriological investigations had produced no positive results.

Sattler laid stress upon the fact that he had never succeeded in demonstrating the presence of lymph follicles in the normal human conjunctiva. They are a pathological product.

Fuchs suggested the possibility of the crescent cells described, being produced by the process of hardening, and stated that he would add to the peculiar cell forms described by Leber " mastzellen," which he had observed in the follicles of a case of atropine conjunctivitis.

Wintersteiner corroborated the observations of Leber and of Fuchs.   J. B. S.

ABADIE (Paris). The Nature and Surgical Treat-
ment of Exophthalmic Goitre. *Archives d'Ophtal-
mologie, November*, 1896.

When the eye symptoms in exophthalmic goitre become
very marked, and the eyeballs are pushed forwards and
project from the orbits to a high degree, the spectacle pre-
sented is a very lamentable one. Not only so, but the
mere fact of this extreme protrusion is apt to be associated
with the gravest complications. For the corneæ, no longer
protected by the lids, which are not able to cover them,
are very apt to ulcerate. Then in spite of one's utmost
efforts, and in defiance of all treatment, the destruction of
the corneæ proceeds more or less rapidly, but infallibly.
Once the corneæ are destroyed, not merely is the patient
blind, but the ugly, bleeding, shapeless globes are un-
pleasing indeed to behold. Fortunately such cases, in
which the full extent of this horrible picture is realised, are
decidedly rare; Abadie however has had three such under
his care. The treatment of the second of these cases of
his he had entrusted to the care of a colleague of high
repute as a neuropathologist who is, (or was) of opinion
that by aid of the judicious application of the galvanic
current in the course of the cervical sympathetic one could
always prevent the exophthalmos from becoming alarming
or dangerous. But just as in other such cases, this patient,
in spite of all efforts, went on from bad to worse till all was
lost. It is a fact to be faced then that in Graves' disease
in which the eye symptoms predominate, the complications
may become extremely serious. Further, of the three
fundamental manifestations of this disease it is the ocular
symptoms with their attendant alteration of the patient's
appearance which are most likely to be the first to attract
the patient's attention and to rouse her alarm. Therefore,
according to Abadie, it is not wonderful that ophthalmic
surgeons (*e.g.* Damours, Mackenzie and Sichel), should
have observed and commented upon this lesion before the
date of the classical delineation of the disease by Graves
and Basedow. Since then, numerous clinical observers

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have further described the symptoms, among whom Trousseau deserves an important place, for it is he who, although his work has not received its due meed of atten- tion, has left us the best account of the nature of the malady. He attained as near to the truth in his day as we have done since, only more recent physiological investiga- tions have enabled us further to work out and better to define the theories which he had so early promulgated. As to modern authors, they have added little to clinical accounts of the earlier observers ; their chief attention has been directed to the elucidation of that very difficult matter—the nature of the malady.

Those of the Salpètrière school are in favour of the theory of a general neurosis, in which a hereditary neu- rotic taint plays a highly important *rôle*, being led to adopt this view by the consideration of the multiplicity of nervous disorders which accompany the three essential features (proptosis, goitre, rapid pulse) of Graves' disease. Certain other neuropathologists, regarding as highly im- portant the recent discoveries concerning the functions of the thyroid gland, have promulgated a theory which at the first glance is highly attractive. A functional overactivity of the thyroid is in their view the starting-point of all the symptoms, there being constantly discharged into the blood products which act as stimulants of the sympathetic system. Thus all those vascular phenomena are second- arily produced whose part in the symptomatology of this curious malady is so important. In favour of this theory of hyperthyroidisation there is the resemblance which exists between the nervous and vascular troubles present in exophthalmic goitre and those which may be produced by dosing with thyroid gland. In addition, certain cases have been recorded in which removal of the thyroid brought about great amelioration in the patient's condition.

But, in spite of these considerations, Abadie is satisfied neither with the general neurosis theory, nor with that of a hypertrophy with over-activity of the thyroid gland. If either of these theories were correct, the vascular disturb- ances ought to be manifested by all the great arteries of

the body, but this is not the case at all. Trousseau pointed
out, and it is unfortunate that his observation has been
so much forgotten, that the vascular troubles are only
manifested in the area presided over by the cervical sympa-
thetics, the carotids are seen to pulsate violently, but at
the same time the iliac and femoral arteries and the
abdominal aorta appear to retain their normal condition.
Now if these vascular symptoms were due to excitation of
the sympathetic produced by the introduction into the
system of a substance elaborated by the thyroid body,
would not all arteries suffer alike ? The rarer cases too,
where the symptoms are limited to one side of the face are
inexplicable on this hypothesis ; for a general intoxication
ought invariably to produce symmetrical effects. In point
of fact, in exophthalmic goitre all parts appear to act as
though there were a permanent excitation of the vaso-
dilator fibres alone of the cervical sympathetic or of their
nuclei of origin, and Abadie believes himself able to prove
that such is in truth the veritable cause of the disease.
Trousseau and certain others have already pointed to the
sympathetic as the seat of the lesion, but while some affirm
that excitation is the cause, others believe it to be paralysis
of the trunk. Whichever of these theories one might adopt,
it is as a matter of fact, inconsistent with some or other
of the symptoms. Abadie, however, taking into considera-
tion the fact that the cervical sympathetic is known to
contain both vaso-dilator and vaso-constrictor fibres, points
out that it is possible that only the former fibres are at
fault and not the trunk as a whole, and that if we suppose
(which pathologically it is quite legitimate to do) that a
lesion has affected these vaso-dilator fibres, we have the
symptoms all explained. Dastre and Morat have pointed
out that vascular dilatation, shown in cheek, lip, &c., can
be brought about by stimulation by electric current of the
roots of the sympathetic at the level of the first, second
and third dorsal nerves.

The permanent excitation of the vaso-dilator fibres of
the great sympathetic in the neck explains then, better
than any other theory, the various morbid phenomena

which mark the disease. The turgescence of the thyroidal arteries have for a *consequence* hypertrophy of that body, which is thus seen to be secondary and not primary. Dilatation of the retrobulbar vessels is the cause of the exophthalmos; it is well known too, that abnormal rapidity of the heart may readily be produced by stimulation of the sympathetic. Abadie does not indeed deny that the en-gorged and enlarged thyroid will pour out a larger quantity of its peculiar secretion, which will in its turn lead to toxic effects, but this he asserts to be purely a secondary and not the primary consideration. This theory enables one also to explain more satisfactorily those abnormal cases, cases presenting an unusual course or an unusual grouping of symptoms, which occur with so great frequency.

Exophthalmos is the principal symptom alike from the deformity it causes and from the danger thus produced to the corneæ; but we have seen that enormous exophthalmos may be connected with but slight hypertrophy of the thyroid and trifling increase in the rapidity of the heart. This fact of exophthalmos being out of proportion to the other two symptoms is readily explained (?) if one admits that it is the centre which presides over dilatation of the retrobulbar vessels which is chiefly affected; and con-versely, when either thyroid hypertrophy or tachycardia is the predominant feature, we may explain this by saying that it is the centre presiding over the thyroid or over the heart which is chiefly influenced to the partial exclusion of the other centres. Lastly, and this is a point which in his own opinion makes greatly in Abadie's favour, these vascular troubles never exhibit themselves except in the region of the head and neck. Now the vaso-dilator fibres of these regions have their nuclei of origin in the bulb and upper portion of the spinal cord; there they are "drawn up in a line," and there they may be picked off separately or attacked in groups. But the vaso-dilators of the lower parts of the body have their centres further down the cord and are never involved in the cases of Graves' disease. But be that as it may, this new mode of regarding the etiology of exophthalmic goitre is fertile in therapeutic

results. If the exophthalmos in particular is due, as Abadie maintains, to an active dilatation of the retro-bulbar bloodvessels, it may be of therapeutic value to divide the sympathetic above the middle ganglion or even to remove the middle ganglion. And in point of fact this has been shown to have the desired effect ; for Jaboulay of Lyons— who, however, does not tell us what exactly led him to do so—has performed this operation on a living patient. He had first worked in the direction of removing the thyroid body in the hope of thus overcoming the disease. The removal of the thyroid did not produce the desired effect, and it failed because he attacked merely a symptom and not the cause. It has been shewn also in at least one case that, after partial removal of the thyroid, the portion left behind has taken on hypertrophic action again. When, however, the cervical sympathetic is divided, all the phenomena disappear permanently. This Abadie considers to be the treatment of the future, and he believes that in a bad case it will be well to carry out this proceeding early to avoid loss of vision. The tachycardia and the enlargement of the thyroid, however, are not so easily dealt with, for the operation which would enable us to divide the nerves presiding over them would be somewhat perilous. The author however does not despair, and he suggests that those cases in which removal of the thyroid has cured the condition have succeeded because, in the operation of ablation, the nerve filaments distributed to the gland and in the neighbourhood have been divided.

[Without discussing whether Abadie has any claim to priority in his views of the pathology of exophthalmic goitre, it must be admitted that there is much to say in favour of them. The strictly "sympathetic" explanation is in some respects unsatisfactory, and the purely "thyroid" theory fails to meet some difficulties. His view, however, of why certain cases are immensely benefited by removal of the thyroid gland, even when enlargement of that organ is comparatively slight—cases whose existence the unwilling Abadie is forced to admit—is certainly not to be accepted.]

W. G. Sym.

C. Hirsch (Prag). Contribution to the Patho-
logy of Retinal Embolism. *Archiv f. Augenheilk.*,
November, 1896.

This is a very careful account of five cases of partial
retinal embolism, with especial reference to the exact
extent of the scotoma produced in each case, and im-
portant deductions as to the retinal blood-supply.

The first was a case in which a small artery arising
from near the temporal margin of the disc, and imme-
diately dividing into two branches, each of which ran
towards the macula, was blocked. The resulting scotoma
was a small triangular area having its apex at the macula,
while its base was a line running perpendicularly through
the blind spot, and extending slightly beyond it above and
below. This case forms an exact converse to sixteen pre-
viously published by various observers, in which, owing
to embolism, the whole of the retina became blind with
the exception of a similar " papillo-macular triangle."

In the second and third of the author's cases the upper
temporal artery was blocked, and the scotoma was, of
course, in the lower nasal quadrant, but did not include
the " papillo-macular triangle." The fourth was a case
in which the embolus was in the main lower division of
the central artery, and the scotoma included the whole
upper half of the field, leaving, however, the before-men-
tioned triangle free.

Now these four cases taken in conjunction with the
sixteen already referred to, prove that the small area in
question has a blood supply peculiar to itself. The ex-
planation has been sought for in the existence in these
cases of a " cilio-retinal " artery, and the first of the
author's cases in which the affected vessel emerged from
the disc very near its margin would serve to support
this view. But in the other three cases there was no
" cilio-retinal " artery, and yet the triangular area
must have had a blood supply distinct from the upper
temporal artery in the second and third cases, and from
the lower temporal artery in the fourth. Small arteries

supplying the area in question could, in fact, be seen in all these cases, either obviously arising direct from the main trunk of the central artery or emerging from the disc at a point intermediate between the physiological cup and the disc margin. From the existence of these gradations the author suggests that the so-called " cilio-retinal " arteries really arise, as the others certainly do, from the central artery itself, only that in the case of the former their origin is lower down than usual. It is obviously possible for an embolus to block the central artery beyond the origin of the macular branch, and on the other hand for the macular branch itself to be alone blocked by a small embolus.

The macula itself, however, is not solely dependent on these vessels of the papillo-macular triangle. It receives blood also from branches both of the upper temporal and of the lower temporal arteries.

From an ophthalmoscopic examination of " hundreds " of normal eyes, the author states that in 70 per cent. the macula has a triple supply (1) from the direct macular arteries ; (2) from branches of the upper temporal, and (3) from branches of the lower temporal arteries. Of this 70 per cent. the direct macular arteries could be seen to take their origin from the central artery itself in 60 per cent. In 30 per cent. they could only be traced from some part of the papilla, and in 10 per cent. they arose from the margin and would be generally called " cilio-retinal," though, as has been said, the author does not regard them as really different in origin to the others.

Of the 30 per cent. of cases in which the macula had not a triple supply, in 24 per cent. he found the macula supplied solely by the upper and lower temporal arteries. In the remaining 6 per cent. the exact supply could not be determined. Only once in a thousand did he find the macula supplied by one temporal artery alone.

Owing to this usually triple supply it follows that in cases of partial embolism central vision is retained far more often than might be expected. In Case 1, for instance, in spite of the fact that the papillo-macular triangle was

blind, central vision, after a few weeks, was $\frac{6}{6}$. There was, however, this peculiarity about it : — " From six metres distance the patient could read the test-types correctly but always jerkily, only three letters at a time, making at the same time movements of his head to the right so as to turn his eye to the left. When made to look straight at the smallest type, he could only see the first three letters."

In this connection the author remarks that the acuity of vision is not in all cases sufficiently defined by stating the line of test-type which the patient is able to see. One must also state whether the whole of the region of central fixation is intact.

A case in point was recently seen under Mr. Morton at Moorfields (with whose permission it is here referred to), in which a smoker, with symptoms of toxic amblyopia, improved in a month from $\frac{6}{24}$ to $\frac{6}{12}$ in each eye. A peculiar jerkiness in the way in which he read the type was very noticeable. On looking straight at the $\frac{6}{12}$ line with the right eye he could only see the first two, with the left only the last two letters. On being tested with the perimeter he was found to have a small absolute scotoma for white in each eye, extending to $15°$ outwards from the fixation point. This case, of course, could have had nothing to do with embolism, but it is curious that the state of the vision in the author's case of embolism was so strikingly similar to it.

The author remarks that the scotoma produced by embolism of one of the main branches of the central artery is not sharply defined, but is bordered by a zone of diminished sensibility. This does not at all point to the existence of anastomoses with the branches of another main artery, for the bulk of the scotoma in these cases remains absolute—a fact which forms an additional proof that the arteries of the retina are true end-arteries. The phenomenon of diminished sensibility is interpreted as an under-feeding of the retinal zone in question. Normally, small twigs from two neighbouring areas supply it. The result of embolism occurring in one of these areas is that

half of the nourishment of this border zone is cut off. It is the existence of these border zones which accounts for the apparent diminution in the area of the scotoma which is sometimes, but by no means always, observed after the lapse of some weeks in these cases of partial embolism.

The fifth of the author's cases is a very difficult one to interpret. After complete blindness of one eye lasting two hours, some vision was recovered in the peripheral parts of the field leaving an absolute central scotoma. Obviously in this case the phenomena could not be explained by the anatomy of the retinal arteries. The author supposes that at first there was a complete block in the central artery—that afterwards the block became incomplete and a small quantity of blood was able to pass, and that this when it reached the main branches, took as direct a course as possible towards the periphery, leaving the macular branches, which arose more or less at right angles from the main trunks, still comparatively empty.

The article closes with some interesting remarks about the ophthalmoscopic appearances in cases of embolism of a branch of the central artery. In Case 1, at the first observation, *i.e.*, at the time when the disturbance to vision was greatest (fingers at 4 to 5 metres), the only retinal change observed was pallor of the papillo-macular triangle. The small arteries appeared normal in size, and exhibited pulsation on pressure. Four days later, when vision had already begun to improve, some narrowing in the lower macular artery was noticed. Three weeks later still, when central vision was $\frac{6}{6}$ and the pallor of the retina had disappeared, the lower macular artery was extremely small, and the upper one was first noticed to be diminishing in size. Subsequently it became as small as the lower one. The explanation offered is that the blockage of the direct macular artery (before it divided into two) was incomplete. At first, enough blood penetrated beyond it to give the branches visible with the ophthalmoscope a normal appearance, but not enough to maintain the blood-pressure necessary for supplying the capillaries with blood. Hence the walls of these latter became atrophic, and,

after a time, the walls of the visible arteries became atrophic also.

Another point worthy of notice is that out of the five cases, in three there was no hæmorrhage at all, and in the other two the hæmorrhages were very slight. There is no support, therefore, for the theory that hæmorrhagic infarcts are common in these cases.

The "cherry-red" colour of the macula in recent cases is a contrast effect due to the absence of the nerve-fibre layer. In older cases where the œdema has passed off and the retina regained its colour, there is often a brown granular appearance about the macula with absence of the normal foveal reflex. This appearance the author collates with a pathological observation of Elschnig's on the micro-scopical appearance of the macular region in a case of embolism. He describes it as a mass of "proliferating con-nective tissue, mixed with the remains of the outer granular layer. In the very centre the layer of rods and cones is entirely wanting. The pigment epithelium is irregular, the cells absent in some places, while in others they have more than the normal amount of pigment, and in others, again, less."

Finally, in cases of embolism of a single branch, the abiding ophthalmoscopic changes are narrowing of the vessels affected and its branches, with pallor of the corres-ponding sector of the disc.

A. H. Thompson.

SCHMIDT - RIMPLER (Göttingen). On Macular
Optic Nerve Atrophy in Diabetes, *Bericht der*
Ophthal. Gesellschaft, Heidelberg, 1896.

The author is of opinion that central scotoma, the result
of retrobulbar neuritis, is of relatively frequent occurrence
in diabetes. Out of 140 patients suffering from diabetic
eye affections, 34 showed that the optic nerves were con-
cerned, there being central scotomata in much the greater
proportion of cases. He is unable to agree with Mauthner
who attributes the optic nerve affection in diabetes to abuse
of alcohol and tobacco. Schmidt-Rimpler has rarely seen
a diabetic patient who smoked or indulged to excess in
alcohol. He does not attribute retrobulbar neuritis to
alcohol or tobacco when the patient is only a moderate
smoker and drinks no more than a couple of glasses of
beer or wine daily. He has seen a number of cases
in which he was sure there had been no abuse of alcohol
or tobacco. And he adduces Hirschberg's case of a woman
who neither smoked nor took alcohol and yet suffered
from diabetic scotoma. On the other hand he holds that
the course of a diabetic neuritis is unfavourably influenced
by tobacco and alcohol.

For the discovery of sugar in the urine it may be neces-
sary to examine the urine repeatedly and at irregular times ;
and one must remember that the general symptoms of
diabetes may be extremely slight, while yet the optic
nerves are undoubtedly affected. In prognosis as a rule,
one must be cautious, especially if the colour scotoma be
absolute, though even then marked improvement may on
occasion be obtained. He instances the case of a judge
aged 46, whose vision in November, 1892, was R. $\frac{1}{30}$,
there being an absolute central scotoma for green and red
(this extended 10° temporally, 5° nasally) ; L. $\frac{1}{18}$, the
scotoma extending 20° temporally, 15° nasally. In July,
1894, vision in R. was $= \frac{3}{8}$, in L. $= \frac{3}{5}$, all colours being
recognised centrally, though on both sides there was a
paracentral spot in which green appeared somewhat pale.
In another diabetic, 28 years of age, who had acquired

syphilis five years before, there was a central scotoma for green, and white appeared dirty; vision $\frac{1}{12}$ in both eyes; papilla slightly hyperæmic. Three months later, after an inunction course of 200 gr., the vision in R. was $\frac{5}{6}$, in L. $\frac{5}{18}$, and the scotoma had become smaller.

Diagnosis is not always easy. Thus in the early stages there may be a small paracentral scotoma, the central vision being quite good; in determining such a scotoma much care and patience is required, both on the part of the patient and of the doctor. In these cases a small white square on which are some fine black points is often of service as a test; the recognition of one or other point in the region of the scotoma is difficult or impossible.

Diabetic retinitis causes an early scotoma for white as well as for colour; whereas the scotoma of diabetic neuritis is at first only a colour scotoma.

The disc frequently shows slight hyperæmia and cloudiness, but for the detection of these changes repeated observation is necessary, so as to establish a standard of comparison. Or there may be partial atrophy, as evidenced by pallor; even then recovery is possible.

Schmidt-Rimpler now gives details of a case which he thinks was undoubtedly one of diabetic neuritis, and in which the changes in the optic nerves agree with those found by Edmunds and Lawford in a case of diabetic amblyopia. A joiner, aged 29, was admitted into the infirmary in March, 1892. In August of the previous year he had noticed that his sight was getting worse, and he began to suffer from headaches. He had been but a light smoker, often not smoking at all for weeks. At breakfast and towards evening he was accustomed to drink a small glass of brandy; beer only exceptionally. The patient was much emaciated and complained of great thirst and hunger; urine contained about 5 per cent. of sugar. Vision L. $\frac{1}{4}$, R. $= \frac{1}{6}$; H. 0·5. On both sides there was an absolute colour scotoma and white appeared grey. On April 2 he died in a state of coma. *Post-mortem* there was found chronic lepto-meningitis, œdema of brain; hyperæmia and flattening of the optic nerves; fatty degeneration

of heart and kidneys; enlarged spleen; small pancreas; and other changes. The optic nerves were hardened in Müller's fluid and stained with Weigert's picrocarmine and hæmatoxylin. There were no changes between the chiasma and optic foramina. About ¾ cm. from the foramen a partial atrophy became visible (in the right optic nerve), the affected bundle lying somewhat nasally; where the vessels entered the nerve it occupied about $\frac{1}{10}$ of the cross section; nearer the bulb the atrophic fasciculus occupied the lower and outer quadrant, adjoining the sheath, and now rather larger in size. So in the left optic nerve, the atrophy not reaching the optic foramen. Here and there in the fasciculus and in the interstitial connective tissue an increase in the number of nuclei was to be noted. The engorgement of the bloodvessels in the interstitial tissue was striking; in places there were even slight extravasations. The diseased process seemed to be dependent on, and the atrophy secondary to an affection of the bloodvessels.

In discussing this paper, Leber said that in 50 cases of diabetes which he had carefully observed 14 had disease of the optic nerves; and he had been struck by the very favourable influence of anti-diabetic treatment on the amblyopia. He thinks that diabetic patients are very susceptible to tobacco-poisoning, so that even moderate smoking may be harmful to them. Hirschberg remarked that prognosis is not very good either as regards sight or life in these diabetic cases. He also urged that the scotoma in diabetes is sometimes due to localised stretching or ectasia of the retina.

W. Watson Griffin.
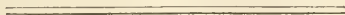
C. Hess (Marburg). On Excentric Formation of the Lens–Nucleus, and the Histology of Posterior Lenticonus. *Bericht der Ophthal. Gesellschaft*, *Heidelberg*, 1896.

Hess has had the good fortune to examine a series of lenses, eight in number, in which the nucleus was not central but lay close to the posterior capsule, either at the posterior pole or between it and the equator. In all the anomaly must have been due to a developmental disturbance. In some the outline of the lens was normal, in five others there was a posterior lenticonus. In three of these latter the conical ectasia of the lens surface was formed by the displaced lens nucleus, which was actually in contact with the capsule ; in the other two this was not the case, the lens fibres lying quite regularly on the little cone. The anterior section of the lens was in all cases normal. Only in one case did the lens capsule, much thinned, cover the lenticonus. In the other four (there seems to be some discrepancy with what is stated above) the posterior capsule lay at the base of the lenticonus, where it had been rent by the growing lens fibres, which, breaking through, developed on the hinder surface of the capsule into a mass having a structure similar to the nucleus.

The clinical picture was quite in agreement with that drawn by F. Meyer and Knapp, the amount of opacity being very slight.

Hess further had the opportunity of examining a rabbit's eyes, of which one presented a typical lenticonus with slight opacity, while the other lens was well-formed, but its nucleus lay against the posterior pole surrounded by an opacity which strongly resembled a zonular cataract.

W. Watson Griffin.

D. DeBeck (Cincinnati). Sub-Conjunctival Cysts.
Annals of Ophthalmol. and Otol., October, 1896.

Small pearl-like lymph cysts of the conjunctiva are by no means rare, and a prick of the needle is sufficient to radically relieve them. But the larger sub-conjunctival cysts are sufficiently unusual to warrant putting on record any well-observed case. Such a case, with microscopical study of the excised cyst, DeBeck reports.

A healthy negro girl, 15 years old, had a swelling of the right lower lid, with epiphora and a feeling of uneasiness and irritation in the eye lasting some months. On drawing down the lower lid, two large, rounded, pellucid cysts were exposed. One, near the inner canthus, was pear-shaped, 15 mm. long and 5 mm. in diameter, and adherent to the plica and caruncle. The other, in the outer half of the lid, was 10 mm. long and 6 mm. in diameter. Over the latter cyst the conjunctiva was freely movable, and it was dissected out entire. The other was evacuated in an attempt to remove it; and collapsed with the escape of clear, pale, straw-coloured fluid. The walls becoming indistinguishable from the surrounding tissues were left undisturbed. Six months later the site of this latter cyst presented a small oval lump, smaller than a grain of wheat, which was thought to be a recurrence. There was no trace of the site of the other.

The cyst removed was embedded and cut. The capsule, which was smooth and independent of surrounding structures, was composed of two easily separated layers. It was lined with pavement epithelium, the cells containing relatively large oval nuclei. Next to the epithelial layer was a thin layer of close connective tissue containing numerous nuclei; then came a loose open band of delicate connective tissue; and on the outside a close layer of ordinary connective tissue. The cyst was not divided by septa; and the contained fluid was almost devoid of leucocytes, presenting some *débris* of broken-down cells.

DeBeck refers to cases reported by Laqueur (one), Makrocki (one), and Moyne (three). He points out that

almost all the cases have been in children or young persons, and that probably a merely fortuitous interference with, or blockage of some of the natural lymph structures, at this time of rapid and active growth, is the starting point in the cyst development. They have been observed in operation wounds and after traumata. Possibly they develop by expansion of some natural lymph space, or they begin by the retention of fluid in some space in the areolar tissue. Judging by the absence from their contents of the cell elements of lymph, they would seem to be properly classed as " exudation," rather than as true " retention " cysts.

Removal entire by careful dissection is the best treatment for this class of case. The mere evacuation of the contents by puncture is very liable to be followed by refilling, in a growth with such a well-developed wall as these cysts generally possess.

E. J.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

E. Nettleship, F.R.C.S., President, in the Chair.

Thursday, January 28, 1897.

Spontaneous Recovery of a Retinal Detachment.—Dr. Lawford Knaggs described a case of spontaneous recovery of a retinal detachment. A woman, aged 21, was shot in the right temple on May 21, 1892. The bullet passed below the right orbit and lodged in the floor of the left antrum. The wound healed quickly. Attention was drawn to the right eye by the patient's complaints of inability to see things in certain portions of the field. Two choroidal ruptures near, and œdema around the macula,

and several large hæmorrhages were seen on the 22nd, and from that date till the early part of July an acute attack of central choroiditis, with much effusion, was observed in its various stages. At this time a large mass of white lymph occupied the neighbourhood of the macula, and was surrounded by a broad frame of pigment, over which several vessels curled, to be buried beneath the mass of lymph. On July 27 a detachment of the retina had formed that when seen end-on, was wedge-shaped, with its apex uppermost. The top of the detachment formed a ridge that ran horizontally backwards till it merged in a track which disappeared beneath the inflammatory mass overlying the macula. The front of the detachment probably reached to the ora serrata. The field showed scotomata corresponding exactly to the central mass and the detachment. The patient was not seen again till November 28, 1893, when the detachment was found to have disappeared entirely, and the re-applied retina was normal in appearance. The central mass had become more triangular in shape, but the track which had led to the detachment was still visible. The scotoma caused by the detachment had gone, and that dependent on the central disturbance had slightly contracted. Central vision was destroyed. The condition was unchanged some time later. There could be no doubt that the detachment was the direct result of exudation gravitating from the central mass of inflammatory tissue, or possibly from a concealed detachment behind it. A detachment produced by inflammatory serum, whose natural tendency was towards absorption, differed essentially from a detachment where the subjacent fluid was a passive effusion filling a potential vacuum. The author divided detachments of the retina into three groups: (1) those occurring in fairly healthy eyes as a result of concussion in some form, as in coughing, blows, &c.; (2) those occurring as the direct result of inflammatory effusion dependent on severe traumatism or on some organic disease; and (3) those met with in eyes which are the subjects of some chronic disease, such as myopia, where degenerative as well as inflammatory

3

changes may share in the production. In groups 1 and 2 spontaneous recovery was more probable and surgical treatment more hopeful (in suitable cases) than in group 3. Dr. Knagg's statements were illustrated by references to recorded cases.

Mr. Cant referred to another case in which absorption and cure occurred in a man aged 24. The detachment was due to a blow from a cricket ball. The eye, though myopic to the extent of 5 D., had previously been healthy. The detachment was treated by pad and pressure to the globe, the retina becoming re-attached, while vessels could be seen growing on its surface.

The President mentioned the case of a woman, aged 30, in whom detachment occurred spontaneously in both eyes which were previously myopic. Under pilocarpine recovery took place till the patient could read J 1, and this condition lasted for some years,[1] but the detachment had recently recurred.

Retention Cyst of the Lacrymal Gland.—Mr. Arnold Lawson read this paper. The patient was a young married woman, aged 19. The tumour had been growing for about four months when first seen. It caused a swelling in the upper and outer part of the left upper eyelid, and was accompanied by considerable ptosis, slight proptosis of the globe downwards and forwards, and slight limitation of movement upwards. On raising the upper lid a soft elastic tumour immediately bulged forwards between the lid and the globe. The tumour was obviously cystic, and had a dark bluish appearance. The skin moved freely over it. There was no glandular enlargement and no pain, and the general health was excellent. The tumour, which grew rapidly whilst under observation, was removed by dividing the external canthus, and having by this means everted the lid an incision through the fornix conjunctivæ completely exposed its anterior surface. It was then shelled out without much difficulty. It lay perfectly free and non-adherent, except along its anterior surface, where

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[1] OPHTHALMIC REVIEW, vol. xiv., p. 367.

it was attached by tags to the subconjunctival tissue of the lid, and at its outer margin, where it seemed to be adherent to the lacrymal gland. The cyst measured 40 mm. in length, and 22 mm. in breadth at its thickest part, and bore a remarkable resemblance in size and shape to a pigeon's egg. Its walls were of extreme delicacy and very trans-lucent. It proved to be a unilocular cyst with a very uneven inner wall, and contained about two drachms of pale, straw-coloured, limpid fluid with a small sediment. Microscopically, the cyst wall was found to consist of a very delicate, loose, wavy, and elastic areolar tissue, denser and more felted toward the external wall. There was a remarkable absence of the cellular element, and it was only after repeated examinations of many sections that any cells could be found lining the cyst wall. Ultimately a few clusters of very minute cells with large nuclei were found scattered here and there in a few of the sections. The cells were irregularly shaped and grouped, but strongly suggested a glandular origin. The cyst fluid was neutral, of a light specific gravity, and contained a fair amount of albumin and a distinct trace of chlorides. The chief feature of the fluid was the presence of numbers of homogeneous bodies presenting great variety of size and shape. They were almost transparent, but stained readily There were also present large numbers of leucocytes and red corpuscles, both floating free and also adherent to the bodies and embedded in them. The presence of fibrin in these bodies was demonstrated by staining after Weigert's method, and they were considered to be probably small detached masses of an albuminous nature which had been coagulated, the precipitation of the albumin being brought about by the presence of alcohol, in a weak solution of which the cyst was lying for some days before examina-tion, and the coagulation resulting from the formation of fibrin from the blood elements in the cyst. This theory was supported by the constant presence of adherent and embedded leucocytes in these bodies. As a further explanation a possible analogy was suggested between the bodies and hyaline casts, probably derived from

some proteid of the renal epithelium, the urine in which they were found being nearly always albuminous. The presence of the epithelial lining to the cyst, the glandular type of the cells, the situation of the cyst, the presence of sodium chloride in the fluid, and the limpid character of the fluid itself pointed very strongly, Mr. Lawson thought, to its being a retention cyst of the lacrymal gland, a disease of extreme rarity. At one time he had suspected the cyst to be of parasitic origin on account of the curious bodies in the fluid, but the nature of its wall made such a diagnosis out of the question.

The report of the Pathological Committee appointed to examine Dr. Hill Griffith's specimen of supposed hydatid cyst was read to the meeting.

The committee confirmed Dr. Hill Griffith's diagnosis : in their opinion his case was one of intraocular hydatid cyst.

Card Specimens.—Dr. Macnaughton Jones : Case of Congenital Closure of the Lacrymal Punctum and Absence of the Canaliculus.—Mr. Work Dodd : Peculiar Changes in the Fundus Oculi.—Mr. Juler : Changes in the Macula.— Mr. J. Griffith : Arrest of Development of Lens.—Mr. Doyne : Retinal Hæmorrhages.—Mr. Treacher Collins : Hæmorrhage into the Sheath of the Optic Nerve.—Mr. Jessop : Detachment of the Retina.—Mr. Higgins : Two Eyes Lost by Spontaneous Hæmorrhage after Extraction of Cataract.

A CASE OF SYMPATHETIC INFLAMMATION OF THE EYE FOLLOWING ENUCLEATION FOR SUBCONJUNCTIVAL RUPTURE OF THE SCLEROTIC.

By E. DONALDSON, LONDONDERRY.

I AM induced to publish my notes of this case as it presents a somewhat unusual history, and has extended over a long period during which it was carefully watched.

On *October* 11, 1891, Mrs. L., aged 33, knocked her right eye violently against the latch of a door, and ruptured the sclerotic above the cornea. I saw her four hours after the accident, and found blood in the anterior chamber, tension much reduced, and a swelling of a bluish colour above the cornea. The conjunctiva was not ruptured. Vision was reduced to bare perception of light. For some time afterwards there was no pain in the eye, and there was no external inflammation.

October 27, 1891.—She complained of pain in and round the eye. There was still some blood in the anterior chamber ; tension was minus ; there was some bulging through the wound in the sclerotic.

October 31, 1891.—Twenty days after the injury the eye was enucleated. There was no suppuration after the operation.

November 26, 1891.—The left eye was quite free from trouble.

November 27, 1891.—Sympathetic inflammation set in, *i.e.*, twenty-seven days after enucleation and forty-seven days after the injury. A number of spots could be seen

Ophth. Review. Vol. XVI., No. 184, February, 1897

4

on the back of the cornea, the pupil was dilated, and vision dim. There was no manifest constitutional cause that would give rise to trouble in the eye, nor was there any history or sign of rheumatism or of congenital or acquired syphilis ; the patient was in good general health. The diagnosis of sympathetic ophthalmia appeared to me to be irresistible. Atropine was instilled, the room was darkened, and mercury was ordered to be rubbed in.

November 28, 1891.—The eye was considerably better, and the improvement continued for some days.

December 12, 1891. — I examined the eye with the ophthalmoscope and found a number of fine dots on the anterior capsule of the lens near the edge of the dilated pupil. The disc did not appear to be inflamed ; its edge was visible all round.

February 15, 1892. — Vision $=$ J. 1. There were some fine dots on the anterior capsule.

November 4, 1892. — Dots on anterior capsule gone ; V. $= \frac{6}{6}$; a floating body was observed in the vitreous.

November 21, 1892.—Slight iritis was present and ciliary congestion marked ; V. $= \frac{6}{12}$ nearly. She was put on hyd. c. creta gr. i. twice a day, and smoked glasses were ordered.

December 3, 1892.—Pupil fully dilated by atropine. Disc seen as through a fog ; V. $= \frac{6}{36}$. There was some pain in brow and top of head. She said the pain was worst when she lay on the right side.

March 9, 1893.—V. $= \frac{6}{18}$. Occasional pain in the eye.

July 25, 1894.—V. $= \frac{6}{6}$ nearly. There was some pain in the left temple.

August 26, 1894.—She complained of pain in the eye ; V. $= \frac{6}{18}$. There was a good deal of ciliary congestion ; the pupil was dilated and acted to light, and at the upper and inner side of the cornea there was some opacity. The pupil varied in size from time to time, and became large when the eye got painful and congested.

December 12, 1894.—I found her with catarrhal oph-thalmia contracted from her baby. The next day she could not count fingers, and she declared that the pain

in the eye was excessive. The catarrhal ophthalmia occurring in an eye suffering from sympathetic ophthalmia caused great pain, increased the ciliary congestion and the opacity of the cornea, and greatly diminished the sight. It lasted the usual time. The conjunctiva of the socket on the right side was not attacked.

December 28, 1894.—She could count fingers at two yards. Pressure phosphenes were very easily produced.

March 5, 1895.—V. $= \frac{5}{24}$; eye quiet. There was considerable opacity of the cornea on the upper and inner side slightly encroaching over the pupil.

October, 15, 1895.—Nearly four years since enucleation; eye quiet. She could read newspaper in good light. Pupil was large and acted to light. She suffered occasionally from pain in the left temple.

July 24, 1896.—V. $= \frac{5}{24}$. Complains that she cannot read newspaper. Lens clear.

September 10, 1896.—Still trouble in the eye. Some pain in left temple and top and back of head. Pupil dilates fully to atropine. V. $= \frac{5}{60}$. Some ciliary congestion most marked above the cornea.

September 25, 1896.—V. $= \frac{5}{36}$.

January 20, 1897.—Vision much worse for the last few days. Pain in eye. Media so obscure that details can with difficulty be made out; slight peripheral adhesions of iris to lens capsule; ciliary congestion. V. $= \frac{3}{60}$.

February 4, 1897.—Eye a little better; V. $= \frac{4}{60}$. She left Londonderry for another part of the country.

Remarks.—Sympathetic ophthalmia occurred in this case after enucleation for rupture of the sclerotic, the conjunctiva being unruptured, and was active more than five years after its onset. The progress of the case was very variable—sometimes the eye was quiet, then again it became painful, vision grew dim, and ciliary congestion returned. The evil effect produced by catarrhal ophthalmia occurring in an eye already affected with sympathetic ophthalmia is noteworthy. The microscope showed a plastic cyclitis in the enucleated eye.

In a series of papers published during the last four years,
Tscherning has drawn attention to certain phenomena
connected with the act of accommodation which, though
discovered and described by Thomas Young a century ago,
have almost escaped the notice of modern physiologists,
and by the careful study of which he has arrived at a
theory of accommodation which is essentially different from
that of Helmholtz. A concise statement of this theory is
given in his paper referred to above, which was read at
the Edinburgh Congress. Crzellitzer gives a systematic
review of Tscherning's various observations, and supple-
ments them by others of his own, the result being entirely
favourable to Tscherning's theory. Stadfeldt's observa-
tions point in the same direction. Hess, on the other
hand, investigating the question in a different way, and
chiefly by studying the phenomena produced by the use
of eserine, records results which appear at first sight to
negative the theory of Tscherning, and to confirm that of
Helmholtz. The object of the present notice is to place
an outline of the evidence on both sides of the question
before our readers.

It is proved beyond question that during accommodation
for a near point the anterior surface of the crystalline lens,
in the pupillary area, increases in convexity. Helmholtz,
having proved this for the pupillary area, assumed as

probable that the whole of the anterior surface becomes more convex, in other words, that the lens becomes more globular, and he attributed this supposed change to a contraction of the ciliary muscle, which by slackening the zonula allows the lens to change its shape by its own elasticity.

Young's observations appeared to show that the in- creased refraction of the lens during accommodation is greater at the centre than at the periphery of the pupillary area. Tscherning, having repeated Young's experiments, confirms his conclusions, and asserts not only that the increase of convexity diminishes towards the periphery of the pupil, but that in the more peripheral zones of the lens surface there is an actual diminution in convexity, so that during the accommodative act the anterior lens surface changes from an approximately spherical form to that of a hyperboloid. Experimenting with the lenses of animals he found that compression at the periphery of the lens flattens the central area of the surfaces, while traction of the zonula increases the curvature in the central area, and at the same time diminishes that of the peripheral zones, a change similar to that which he had found to occur in the human eye during accommodation. He concludes that accommodation for a near point is produced, not by relaxation, but by increased tension of the zonula due to contraction of the ciliary muscle. In the ciliary muscle he distinguishes two portions—a superficial layer consisting of longitudinal fibres which are inserted anteriorly in the neighbourhood of Schlemm's canal, and a deep portion composed of fibres which are at first longitudinal, and then, changing their direction, become circular and mutually interwoven. Posteriorly both portions end in the choroid. During contraction of the muscle the anterior part of the deeper portion makes traction on the zonula, gives to the lens the form which it assumes during accommodation, and at the same time tends to displace it backwards; meanwhile the posterior extremity of the muscle makes traction on the choroid so as to increase the tension of the vitreous body and maintain the lens in its

place. Tscherning shows diagrammatically that the total change of shape which the lens will have to undergo in order to effect a given increase of curvature in the pupillary area, would be considerably less according to his theory than according to that of Helmholtz.

We will now follow Crzellitzer in his review of the various methods of investigating the points in question.

(1) *Different Refraction of Different Zones of the Lens during Accommodation.*—Parallel rays passing through an ordinary convex lens are refracted unequally according to their distance from the central ray, the marginal rays being refracted more strongly than the central. This spherical aberration produces certain results which may be demonstrated as follows :—By means of a lens of two or three inches focus, condense the light from a distant flame on a white screen, so as to form not a sharp picture of the flame but a diffusion circle. The illuminated area will not be equally bright throughout. If the screen stand nearer to the lens than its focal point, the illumination will be brighter at the margin than at the centre ; if it be beyond the focal point, the illumination will be brighter at the centre than at the margin. Now pass a needle in front of the lens so that its shadow falls on the illuminated area. The shadow will not be a straight line throughout, but will become curved as it approaches either side of the illuminated area, the curvature being convex towards the margin or towards the centre according to the position of the screen, for the same reason that the rays of light are concentrated towards the margin or towards the centre respectively. These phenomena, which exhibit the different refractive powers of different zones of a spherical lens, are employed by Tscherning in investigating the refraction of the crystalline. The eye is directed to a distant point of light. A plano-convex lens held in front of it forms a diffusion circle on the retina, and two series of parallel straight lines crossing each other at right angles engraved upon the lens take the place of the needle. Cocaine is used so as to dilate the pupil without paralysing the accommodation. In most healthy eyes the amount of spherical

aberration is less than it would be were the refracting surfaces truly spherical; that is to say, there is a natural correction. But the correction is seldom complete : there is almost always some concentration of the light and some curvature of the more peripheral lines, either towards or away from the centre. But—and here is the important point—in all eyes the act of accommodation causes a well-marked concentration of the light, and a curving of the lines, towards the margin of the illuminated area. This proves that during accommodation the refraction of the central rays increases more than that of the marginal rays, and seeing that the curvature of the cornea remains unchanged, it follows that the curvature of the lens sur-face increases more in the central than in the peripheral zones.

(2) *Measurement of the Refraction in the Central and Peripheral Zones.*—When we look through two small holes, or two narrow slits, placed close before the eye, the particular point for which the eye is focussed is seen single, while every nearer or more distant point is seen double. If instead of a point, we look in like manner at a straight line directed away from the eye, we see two lines crossing each other at a small angle ; their point of intersection is the point for which the eye is focussed. If the refraction of the media varies in different parts of the pupillary area, the point of intersection will be nearer to or further from the eye, according to the part of the pupil over which the two slits are placed, and the position of the point in each case, as indicated by a graduated scale, becomes an index of the refraction at that particular part of the pupil. This prin-ciple can be applied in investigating not only the static refraction of the eye, but also the changes which occur during the act of accommodation. On this principle Thomas Young constructed his optometer, and by the same means Tscherning has recently repeated and amplified Young's experiments. With regard to the details of the experiments, it must suffice here to say that corneal astig-matism was carefully eliminated, and instead of moving the two slits from one part of the pupillary area to another,

two pairs of slits were used simultaneously, so that the different refractive powers of different regions could be observed at the same moment. Cocaine and other mydriatics, unknown in Young's day, were employed in order to expose as large an area as possible to observation. The general result may be stated as follows :—The increase of refraction which occurs during the act of accommodation is in many cases distributed unsymmetrically over different parts of the pupillary area, but in all cases it is much greater in the central than in the peripheral parts. In certain cases the peripheral zone shows an actual decrease of refraction during accommodation ; for example, Tscherning found in his own eye that the zone situated 2 mm. from the centre of the pupil showed no change, and the zone external to this showed a decrease of refraction, and Crzellitzer observed the same in his eye with regard to the zone 1·3 mm. from the centre.

Now if the refracting surfaces of the lens remained spherical during accommodation, the increase of curvature would involve an increase of spherical aberration, that is to say, the peripheral refraction would increase more, not less, than the central, provided that the index of refraction remained unchanged. Two suppositions only, then, are possible : either the index of refraction changes so as relatively to diminish the refraction of the peripheral zone, of which there is no evidence whatever, or the refracting surfaces, one or both, instead of maintaining a spherical curve assume the form of an hyperboloid. A diagram shows very clearly that this latter change involves a much smaller alteration in the general shape of the lens than does the general increased sphericity assumed by Helmholtz.

(3) *Reflection at Different Parts of the Lens Surface during Accommodation.*—The methods of observation described above reveal specific changes of refraction, but do not enable us to refer them positively to one or other surface of the lens. The study of the reflexes differentiates the two surfaces and has the further advantage of being purely objective, so that the observations made in a given case

can be controlled by several observers. Three lamps, standing equi-distant from each other upon a horizontal bar, are placed before the eye so that the images reflected by the anterior lens-surface are seen close to the upper margin of the pupil. During relaxed accommodation the three images stand in a straight line, indicating that the reflecting surface is approximately spherical. During accommodative effort they move nearer to the centre of the pupil, indicating an increased convexity of the surface, but they do not move equally; the middle image moves more than the two outer, so that they now form a line which is convex towards the centre of the pupil, indicating a greater increase of convexity near to the centre than in a more peripheral zone. By using two series of lamps, one forming a row of images at the upper margin of the pupil, the other at the lower margin, the relative movements of the middle and outer images can be determined by measuring the vertical distance between each corresponding pair. We will not attempt to follow the calculations by which Tscherning endeavoured to estimate the relative participation of the anterior and posterior surfaces of the lens in the accommodative change; it will suffice here to say that these observations with the phakometer confirm the fact that the anterior surface assumes the form of a paraboloid during accommodation. They also gave fresh evidence of a fact previously described by Tscherning, viz., that during accommodation the lens assumes a lower position in relation to the axis of the eye than during the state of rest; a movement the result of which is to centre it more accurately with the cornea, and which, according to Tscherning's supposition, is effected by unequal traction of the zonula.

(4) *Experiments on the Eyes of Animals.*—Lastly, in corroboration of Tscherning's theory, we have the fact that in the eyes of horses, oxen, and dogs, direct traction of the zonula is found to affect the curvature of the lens surface exactly in the manner indicated by the foregoing observations. Cornea, iris, and ciliary body having been carefully removed, the lens was studied both as it lay in the vitreous

body and after separation from it. Throwing light upon it by means of a convex lens, so as to obtain a circular reflex of considerable size, Tscherning observed the changes which occur in the shape of this reflex when he made traction on the zonula at two opposite points of the circle. He found that the circle became an oval. When the light was thrown upon the central area of the lens the *smaller* diameter of the oval corresponded with the meridian of traction, showing that in this meridian the reflecting surface had become more convex. On the other hand, when it was thrown upon the peripheral region, the *larger* diameter of the oval corresponded with the meridian of traction, showing that the convexity had diminished. Crzellitzer contrived an apparatus by means of which he could make traction in several meridians simultaneously, and could at the same time measure the curvature of the central area by means of the images of two candles and by Javal's ophthalmometer. He found that traction of the zonula rendered the central area of the lens more convex, and that relaxation diminished the convexity.

Stadfeldt records some observations on the human lens made at the Sorbonne. In eleven living eyes he measured the radius of the anterior lens surface by means of Tscherning's ophthalmo-phakometer, and found it to be on the average 10·5 mm. In six lenses measured by Javal's ophthalmometer after removal from the eye, he found it to be on the average 11·4 mm. The average convexity was greater, therefore, while the lens was in the eye than when it was removed, and thereby freed from the traction of the zonula. (The value of this observation would have been greater if the ages of the persons examined had been stated.) In the second place he examined several lenses in the following way. The lens, together with its zonula, was fixed by a number of pins upon a cork ring, and its focal length was determined by observing the image of a distant point of light by means of a microscope. In some cases, by reason of an unequal traction of the zonula, the lens was rendered astigmatic to the extent of 4 or 5 D., and when the curvatures of the two surfaces were exam-

ined with the ophthalmometer this astigmatism was found to be due chiefly to deformation of the anterior surface. The meridian of greatest curvature having been determined, the pins fixing the zonula in this meridian were removed. Thereupon the astigmatism disappeared. The removal of the pins, by slackening the zonula in a given meridian, had increased the radius of curvature, *i.e.*, diminished the convexity of the lens surface in that meridian.

Let us now examine the difficulties which Tscherning's theory has to meet. They do not appear to be insurmountable. According to Helmholtz the anterior surface of the lens advances during the act of accommodation, while the posterior surface maintains its position unchanged ; in other words, the antero-posterior diameter of the lens increases, a change which is inexplicable by Tscherning's theory. With regard to the advance of the anterior surface there is no contradiction ; Tscherning has observed it in certain cases, while in others, on the contrary, he has seen this surface recede during accommodation. As to the alleged increase in the thickness of the lens, it must be remembered that Helmholtz inferred this from the calculated position of the posterior surface, and that this calculation, in any case extremely subtle, would be vitiated by the assumption which Helmholtz made, that the anterior surface is spherical during the state of accommodation. Tscherning attributes the change of position exhibited by the anterior surface, whether backwards or forwards, to a displacement of the lens as a whole. He shows that the ciliary muscle exerts in all probability a certain traction backwards as well as forwards, and that according to the preponderance of one or other of these forces or their mutual compensation, the lens will retire, advance, or maintain its position.

The crucial question is whether the tension of the zonula increases or diminishes during the act of accommodation, and to this point Hess has specially devoted his investigations. In a number of eyes in which iridectomy had been performed, he studied the relative positions of the ciliary processes and lens margin under the influence of atropine

and eserine. He found that the intervening space is diminished by eserine. He found further that the lens margin, which in the state of rest and under the influence of atropine presents a wavy outline and a more or less radially furrowed surface, loses this unevenness under the action of eserine. He regards these changes as indicating a slackening of the zonula. More significant still, the use of eserine causes, in the large majority of eyes, a manifest instability of the lens. At a certain stage of its action, especially in eyes already under the influence of homatropine, namely, when spasm of the accommodation has set in, but the pupil is still uncontracted, the lens trembles on the slightest movement of the eye. This, he holds, is absolute proof that eserine slackens the zonula. The absence of this trembling at a later stage when the pupil is fully contracted he attributes to the steadying influence of a rigidly stretched iris. Going a step further, he shows that the trembling of the lens may in certain eyes be brought about without the use of eserine by a sufficiently strong effort of the accommodation. How is it possible to explain the trembling of the lens if, as Tscherning asserts, the zonula is rendered more tense by the accommodative effort ? Crzellitzer, having repeated and confirmed Hess's observations on this point, gives an explanation which appears to be reasonable. The ciliary muscle, he says, like every other muscle, when subject to a violent impulse, and especially when under the influence of certain drugs which increase its irritability, responds, not by a state of altered equilibrium, but by clonic spasm—a rapid alternation of contraction and relaxation which here manifests itself by a trembling of the lens. Were this trembling the expression of a permanent slackening of the zonula by over-action of the ciliary muscle, it should be most manifest at the time when the eserine has exerted its maximum influence on the muscle, and not, as it actually is, during the stage of spasmodic irritability. He rejects the hypothesis that the lens is held steady in the later stage by the tension of the iris, in spite of a slack zonula.

With regard to the position which Helmholtz took in

this matter, Crzellitzer reminds us that that great authority put forward his theory, not as being proved, but as being provisionally the best explanation of the then known facts. Young was only 27 years of age when he made his investigations ; Helmholtz was more than 10 years older when he repeated them and failed to corroborate the results which Young had obtained ; had he taken up the question at an age when his accommodative power was stronger and his pupil wider, or had he enjoyed the aid of modern mydriatics, his conclusions might have been different. We think it fair to point out here, too, in view of the extremely strong position which Tscherning's theory unquestionably takes, that Schoen, another ardent investigator of the subject, has for years past advocated a theory of accommodation which has much in common with this. Lastly, English readers will recognise with special satisfaction that Tscherning, in laying his own admirable work before modern physiologists, has done ample justice and honour to the investigations of Thomas Young.

P. S.

C. HESS (Leipzig). On the Occurrence of Partial Contraction of the Ciliary Muscle for the Correction of Astigmatism. *Von Graefe's Archiv*, *vol. xlii.*, *pt. ii.*, *p.* 80, 1896.

This is the second of two articles dealing with the physiology of accommodation, the first of which has been noticed already in connection with Tscherning's theory of accommodation. In the first section of the present article Hess reviews the observations which have been published by various writers since Giraud Teulon first started the idea concerning the supposed correction of astigmatism by partial contraction of the ciliary muscle. He shows, as

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others have done, that those who have adopted this idea have overlooked several sources of error in the methods of experiment. The first of these is the influence of a narrowed palpebral aperture. That an emmetropic eye can obtain a clear picture in spite of a weak cylinder, placed with horizontal axis before it, is no proof of a correction of the astigmatism by the eye itself, unless narrowing of the palpebral aperture be avoided, for by means of such narrowing the vertical dispersion may be almost completely abolished. Having rendered a camera astigmatic by means of a weak cylindrical lens, Hess obtained two pictures of a series of concentric circles; the first, taken with an ordinary circular diaphragm, shows blurring of the circles in all meridians except one; the second, taken with a slit instead of a circular aperture, gives almost perfect definition throughout. A second source of error has been the employment of test objects which were not sufficiently fine or small to render manifest a slight want of definition. In illustration of this point Hess gives a photograph of Snellen's radiating lines, which consist of an outer thick and an inner thin series. In the latter series the astigmatism, i.e., the want of definition in certain lines, is very obvious, while in the former it is much less noticeable. For accurate investigation it is essential to determine the amount of refractive error which is consistent with apparently normal definition. A third source of error lies in the varying size of the pupil. Here again Hess illustrates his point by means of photographs, which show, for a given amount of astigmatism, a great want of definition when a large aperture was employed, and a good definition when the aperture was considerably reduced. The difference is very striking.

In Section II. Hess discusses the manner in which astigmatics ordinarily minimise their difficulties. The astigmatic eye, when accurately accommodated as regards either of its two chief meridians for a point of light, sees this point as a line, the direction of the line being at right angles with the meridian employed. We may speak, therefore, of such an eye as having an anterior and posterior

linear focus. When accommodating so that the inter-
mediate meridian focuses the point of light, it sees a
diffusion circle instead of a line, for the dispersion is equal
in all directions. Does the astigmatic commonly employ
his " circular focus," or one or other of his " linear foci " ?
It has been generally assumed that he does the latter,
focussing accurately for vertical or horizontal lines (sup-
posing his chief meridians to be vertical and horizontal),
and changing from one to the other. Hess declares that
astigmatics habitually use the circular focus, and gives
good evidence in favour of his statement. The presump-
tion certainly is that a better acuteness of vision is obtain-
able by using the circular focus, for in this way no part
of the object is viewed with an error of refraction greater
than half the amount of the astigmatism, and the general
form of the object, though imperfectly defined throughout,
is not distorted. These points are well illustrated by
photographs of Snellen's test-types taken with an astigmatic
camera focussed alternately for vertical and horizontal
lines, and half way between the two. In order to test the
matter with regard to the eye itself, Hess experimented
with the " haploscope " or mirror stereoscope, which
enabled him to present fine print to the one eye and fine
crossed threads to the other simultaneously. Refraction
being equal in the two eyes, it was necessary to place the
threads at the same distance as the type in order to see
them well defined, and it was then found that a displace-
ment equivalent only to $\frac{1}{8}$ or $\frac{1}{10}$ D. sufficed to impair their
definition. On making the reading eye astigmatic by
means of a cylinder of 1 or 2 D., the type was at first
illegible, but it soon became clearer ; by then adjusting
the position of the threads for the other eye, it was proved
that the reading eye had altered its refraction by about
half the amount of the astigmatism, or in other words that
it had adopted the circular focus for the purpose of dis-
tinguishing the type. Further experiments of the same
kind with naturally astigmatic eyes confirmed this result.
By means of the shadow test, also, Hess found that the
distance at which an astigmatic placed printed letters in

order to read them, corresponded with a point midway
between his longer and his shorter focus. The selection
of this point is most precise in the cases where the
principal meridians of astigmatism are oblique, for in such
eyes the distortion and illegibility of the type is greatest.

Section III. deals more particularly with the question of
the supposed partial contraction of the ciliary muscle.
The fact already stated, that the astigmatic eye commonly
employs its circular focus and thereby equalises the dis-
persion and distortion of the retinal images in different
directions, suffices to explain many of the observations
which have been supposed to indicate a power in the eye
of correcting its own astigmatism. As a crucial test, how-
ever, Hess constructed an apparatus of extreme delicacy.
Two perfectly transparent circular plane glass plates, each
crossed by a cocoon-fibre of silk, were placed in front of
the eye under examination. Their distances from the eye
and from each other could be varied at pleasure, and each
plate could be rotated so as to bring its cross fibres into
any desired meridian. The fibres were viewed against
a uniform white background. This supplied the means
of simultaneously measuring and comparing the focal
distances of any two meridians of the cornea. Very slight
changes in the distance from the eye of either thread
sufficed to impair its definition. For the non-astigmatic
eye the threads had to be almost exactly at the same dis-
tance from the eye ; for the astigmatic eye they had to
be separated by an amount corresponding with the degree
of the astigmatism. The conditions of the experiment,
which provided for a very slight and gradual alteration of
the definition in either meridian, appeared to be favourable
for the induction of any compensatory action in the ciliary
muscle if such were possible, but in no single instance
among many cases examined was there any evidence of
such action.

P. S.

SCHIMMELPFENNIG (Jena). A Case of Infantile
Conjunctival Xerosis with Keratomalacia.
Graefe's Archiv f. Ophth., xliii., I.

The author reports the case of a child 18 months old,
who after four weeks of diarrhœa, developed inflamma-
tion in both eyes. When seen four days later the condi-
tion was as follows. R.E.: The lids were closed and
covered with some secretion ; on opening them a large
central purulent ulcer, which had already perforated, was
seen. The cornea was diffusely cloudy ; the eye only
slightly injected, while there was extensive xerosis of
the conjunctiva, as evidenced by thick white layers in
the region of the palpebral aperture. L.E. : Extensive,
almost circular xerosis of the conjunctiva, forming white
scaly layers. The conjunctiva was parchment - like in
appearance. The cornea in its lower half showed slight
irregularity of the epithelium. The child was in a lamen-
table condition from want of proper feeding. Treatment :
sublimate ointment 1 : 3,000, and boric acid compresses.
During the next day and night the child was very restless
and refused nourishment, and died suddenly the following
morning. Double basal pneumonia was found *post-mortem*.
Both eyes were removed, hardened and stained. The
corneal section (R.E.) showed changes such as are met
with in progressive infected ulcers, and need not be par-
ticularised. The whole conjunctiva was thickened ; its
superficial epithelial cells stained but feebly, and only
showed nuclei here and there ; the deeper layers stained
better, the deepest sending tongue-shaped processes of
thickly packed cells into the loose connective tissue, these
cells being cubical or cylindrical in form, and their nuclei
staining well. The connective tissue was much infil-
trated, especially about the vessels. L.E. : The substantia
propria of cornea showed no particular changes, except
scattered lymph cells near its periphery ; here, too, the
epithelium was affected, the most superficial cells being
finely granular and showing no nuclear staining, while
between them there was a fine deposit. The nuclei of the

underlying layer of cells do for the most part stain, but the cells themselves vary in shape and size, their limits not being sharply defined ; a few leucocytes are to be seen. The cells next to Bowman's membrane are finely granular ; only a few nuclei stain, their limits are indistinct, and there are vacuoles in and between them. Towards the middle of the cornea nuclei again become evident in the most superficial and also in the deepest layer of cells. At the limbus the epithelial layer becomes considerably thicker ; and beneath it the connective tissue is much infiltrated, the infiltration extending as far as the conjunctival changes. The outermost layers, which appear irregularly separated, consist of slightly altered flat cells which only in their deeper layers fail to show coloured nuclei. Some of the cells have not taken on any of the stain (hæmatoxylin-eosin) at all. The deeper layers have taken on a light bluish-red tint, while some of the outer cells have a grayish-yellow tint. A finely granular cloudiness is often visible, both in and between the cells. Next comes a layer of short spindle-shaped cells with large oval nuclei which stain well, though in places the colour has disappeared. Then follow closely-packed cylinder - cells whose long nuclei lie close beside one another ; they project in the form of little arches and processes into the connective tissue. Between the cells are scattered lymph-cells. Here and there in the conjunctiva, and involving not only its epithelium but also its connective tissue, are spots of necrosis. The tissue-nuclei and the nuclei of the lymph-cells have not taken on any stain ; even the parietes of the superficial blood vessels have a granular appearance and show no nuclei ; their lamina appear empty, and the endothelium has only stained in patches. More peripherally the epithelial layer increases in thickness and its superficial cells again contain nuclei which stain, though even here localised patches of necrosis are visible. Still more peripherally numerous chalice-cells are found, massed together in pockets, lined by tall cylindrical cells with prominent nuclei. The vessel walls are crowded with cells, and their sheaths with fine granular masses.

In order to determine the presence of micro-organisms a number of sections were stained with Löffler's methylene-blue solution. R.E.: In the region of the ulcer lay great masses of micro-organisms which even under a low power appear as deeply coloured plaques; they are thickest at the margin and form actually pure cultures. Thick masses traverse the necrotic parts of the cornea, and extend in strings into the less changed cornea. They consist throughout of cocci, singly or in twos, or in chains of three or four. At one spot a group of rods exists. Especial attention was paid to the vessels, but no cocci were found in them. L.E.: In the corneal epithelium no micro-organisms were found except quite near the limbus; here in the necrotic epithelium large numbers of cocci (and some rods) were present, and resembled in grouping and size those found in the other eye. Here and there were lines of cocci in the deeper epithelial layers; but none in the vessels.

The author remarks that the changes in the *left* eye were manifestly an early stage of the affection, but show that keratomalacia with pronounced xerosis of conjunctiva had set in; further implication of the cornea would certainly have followed had the child lived. As regards the conjunctiva, the marked thickening, the necrosis and fatty degeneration of the superficial layers, the increase in the deepest layer, with its conical proliferations, were specially noticeable, *i.e.*, along with degeneration changes there was rapid new formation of epithelial cells. The corneal epithelium at the limbus showed a tract of necrosis on its surface and its deepest layers, the intermediate layers being apparently unaffected. As cocci greatly predominated over rods we may assume that the former were the cause of the necrosis. The manifold changes on the surface, and the fact that no cocci, &c., were found in the vessels leads one to believe that the infection was ectogenous, the general weakness of the patient facilitating the local action of the cocci on the enfeebled tissues.

Clinically, the xerosis of the left eye agreed closely with that seen in adults, and the two are perhaps not to be

sharply distinguished in their genesis, although the in-
fantile form has a decidedly necrotic character.

Schimmelpfennig prefixes to his case an abstract of the
opinions put forth from time to time as to the bacterial
nature of xerosis. As regards Neisser's xerosis-bacillus,
Schreiber found it in phlyctenular conjunctivitis, trachoma,
chronic and acute conjunctivitis, and even on the healthy
conjunctiva, and thinks that it does not play any special
rôle either in xerosis or other eye affection.

W. WATSON GRIFFIN.

REPORT OF THE TWENTY-FIFTH MEETING OF THE OPHTHALMOLOGICAL SOCIETY AT HEIDELBERG. *Wiesbaden, J. F. Bergmann.*

E. FUCHS (Vienna). *Fungus Collections (Pilzrasen) on the
Conjunctiva.*—Fuchs described four cases in which he had
found small yellow-white spots on the conjunctiva of the
upper lid. These spots were raised, had a smooth surface,
and varied in size from microscopic dimensions up to
nearly that of a pin's head. They resembled strongly
meibomian infarcts, but differed in lying on the conjunctiva
and not in it, and also in being in situation where mei-
bomian glands do not exist. They were easily scraped off
the conjunctiva, and were found then to consist of masses
of fungi of the streptothrix group, which may possibly
have been actinomyces, but the cultivative experiments
failed to establish the differential diagnosis.

The little yellow spots were found to be concretions
sunk in the conjunctiva, in spaces lined by epithelium,
exactly as the actinomyces colonies are in the cases of
actinomycoses of the conjunctiva described by de Vincentiis.

Fuchs brings forward the suggestion that the pressure of the globe against the lid causes this depression of the fungus in the conjunctiva, while the surrounding tissue is raised up by slight inflammatory proliferation. He has not yet been able to ascertain whether the little yellowish nodules so often seen in the conjunctiva of elderly persons are due to a similar mycosis.

E. FUCHS (Vienna). *Transfixion of the Iris.*—In cases of annular synechia posterior, where iridectomy is usually difficult to perform, Fuchs has adopted the operation of simply transfixing the iris. He inserts a Graefe's knife (with its surface parallel to the plane of the iris), about 1 to 2 mm. from the corneal margin in the horizontal meridian of the cornea. The knife is then passed through the iris and out at the corresponding point at the other end of the horizontal meridian. By this means four separate openings can be made in the projecting iris in many cases.

A. VOSSIUS (Giessen). *Cyst of Conjunctiva of Upper Lid.* —Conjunctival cysts have up to the present been seen only on the conjunctiva of the globe or the fornix, and Vossius brings forward the description of a case of bilateral symmetrically placed cysts of the conjunctiva of the upper eyelids. The cysts contained a yellowish fluid, in which no micro-organisms were detected. Vossius describes the tumours as multilocular cysts, somewhat resembling a cyst adenoma, and ascribes their origin to a retention of secretion in what were originally gland-like epithelial tubes.

TH. GELPKE (Karlsruhe). *Ætiology of Acute Epidemic Catarrh* (*Schwellung's Catarrh*).—This paper contains the results of bacteriological investigation of an epidemic in which Gelpke had more than 50 cases under observation.

A micro-organism was regularly present, and successful cultivations were made systematically. The microbe is described as a short and somewhat pointed straight bacillus of pus 0·6 — 0·7 μ length, and 0·2 μ breadth, and exhibiting no spontaneous movement. A band-like lacuna can be seen in its centre, so that it looks at first sight like two bacilli joined by their ends. This appearance is decep-

tive, for often lacunæ develop as the bacillus grows in length—not in breadth, and knobby excrescences develop at its extremities. No spores, however, could be produced. As regards the frequency of the occurrence of this bacillus in the conjunctival secretion of other maladies, it was found twice in 7 cases of follicular conjunctivitis, once in 11 cases of acute catarrhal conjunctivitis, and was absent entirely in 5 cases of chronic conjunctivitis, 8 cases of phlyctenular conjunctivitis, and 3 cases of traumatic conjunctivitis. In 15 consecutive cases of Schwellung's catarrh it was present.

Positive results were obtained in 5 cases out of 7 human conjunctivæ when inoculation experiments were tried. The 5 successful cases were ones in which, from different causes, slight conjunctivitis was already present before inoculation.

A. GROENOUW (Breslau). *Cocaine in Glaucoma.*—Most text-books warn the surgeon against the employment of any mydriatic, cocaine included, in acute glaucoma. Groenouw regards the prohibition as based more upon theoretical consideration than actual observation, and records in the paper some cases of glaucoma which were benefited by the instillation of cocaine: (1) acute glaucoma in a man of 70, markedly improved by cocaine, which improvement was not increased by eserine ; (2) absolute glaucoma with double iridectomy in a woman of 71—an acute attack relieved by cocaine ; (3) absolute glaucoma with iridectomy in a man of 61—cocaine on two occasions cut short an acute attack as in case 2 ; (4) acute glaucoma in an amblyopic eye of a middle-aged woman, also relieved by cocaine ; (5) acute glaucoma in a man of 63, whose sound eye had already been iridectomised for acute glaucoma. There was great benefit from cocaine, with which was also given salicylate of soda.

In consequence of these observations, Groenouw advocates the use of cocaine in glaucoma, not as a substitute for iridectomy, which alone is a cure for the disease, but as a useful symptomatic remedy, which combines the mydriatic action of atropine with the tension-reducing action of eserine.

In the discussion on Groenouw's paper, Schirmer stated that he had found cocaine useful in a case of chronic inflammatory glaucoma, and endeavoured to account for the good effect on the hypothesis that the mydriatic effect of cocaine only depends upon its action on the vaso-motor nerves, so that though the pupil enlarges the iris becomes thinner, and therefore does not block up the spaces of Fontana.

Pflüger observed that his experiments have shown that in the normal eye both atropine and cocaine lower tension, and eserine and pilocarpine at first raise it, pilocarpine to a less extent than eserine. To this is to be attributed the occasional bad effect of eserine in glaucoma, and the better effect of pilocarpine. But as regards mydriatics, they are certainly dangerous for all eyes in the status glaucomatous, cocaine naturally less so than atropine.

Wagenmann stated that he had seen very injurious effects produced by cocaine in glaucoma, and protested against its use being recommended.

Schön would account for the bad effects of atropine in glaucoma by its action on the ciliary muscle, which results in a slackening of the zonula, and thus permits the crystalline lens to be thrust forward. Cocaine has little or no action on the ciliary muscle, and therefore may do good, not harm.

PFLÜGER (Bern). *Parenchymatous Keratitis.*—Pflüger holds with v. Hippel (*vide* OPHTHALMIC REVIEW, vol. xv., p. 275,— Sept., 1896) that parenchymatous keratitis is not a primary inflammation but the effect of a uveitis, and that while syphilis is the most important cause of the affection it is by no means the only cause. His view is that probably all zymotic diseases (infectious krankheiten) which set up uveitis may under certain conditions induce parenchymatous keratitis. He described an epidemic of agalactia contagiosa which he had the opportunity of observing in a herd of goats. Out of twenty-four affected animals eleven suffered from parenchymatous keratitis.

This keratitis differed in only two respects from what we observe in human eyes—(1) the occurrence of shallow or

deep ulcers (in one case an ulcer perforated and led to formation of a staphyloma), and (2) an intensely dark pigmentation of the cornea. The latter is probably derived from the pigment normally situated in the limbus of the goat's eye, but may possibly be hæmatogenous. The ulceration Pflüger regards as merely a complication usually the result of trauma. It must be remembered that ulceration occurs in man also, and has been described by Stellwag and others.

Cataract was not present in any of Pflüger's cases, although it has been described as occurring in previous epidemics by other observers.

Joint affections were present in sixteen out of the total number of goats attacked, and two of them had inflammation of tendon sheaths.

Four of the goats suffered from cold abscesses subsequently.

Pflüger is of opinion that the association of chronic skin disease with uveitis, and its consequent keratitis is not merely accidental. He described two cases in support of this view. One, that of a young man suffering from Lichen ruber acuminatus et planus (which subsequently presented the aspect of psoriasis vulgaris), who developed bilateral parenchymatous keratitis. The disease of the eyes began with an acute outbreak of conjunctival herpes. The second was that of a man of 53, who suffered from psoriasis and also bilateral parenchymatous keratitis and iridochoroiditis.

As regards influenza, Pflüger has observed more than thirty cases of parenchymatous keratitis among its sequelæ.

The first and rarest type of the keratitis is that which most closely approximates to the classical interstitial keratitis. This Pflüger has only seen in adults, and but one eye has been implicated. The second type resembles the keratitis nummularis of Stellwag. The third type is characterised by severe iritis complications, and a peculiar formation of fissures in the diffused opacity of the cornea. With the binocular lens these fissures can be seen to be of some millimetres in length, and changes in the way of widen-

ing, and lengthening, and joining together of fissures, or of narrowing and obliteration can be perceived during a few minutes of observation. While the rest of the cornea may be quite opaque its pupil and iris can be clearly seen through those fissures. These movements are ascribed by Pflüger to the action of the lymph stream, but they may possibly take place—not in the corneal tissue, but in an exudation on its posterior surface.

In the following discussion the occurrences of paren-chymatous keratitis in dogs and bears were mentioned, and Wintersteiner protested against the identification of the keratitis described by Pflüger with the keratitis nummu-laris of Stellwag, which is more of the herpetic or ecze-matous type of inflammation.

WAGENMANN (Jena). *Eye Affection in Gout.*—Gout is comparatively rare in Germany, but Wagenmann has noted a number of eye affections occurring in gouty patients. First of all, seroplastic inflammation of the eye tunics, more especially of the sclerotic, and iris, with exudation into the tissues, and formation of actual "concrements." The latter he has seen, not alone in the sclerotic, but in the choroids lying near the papilla and causing ablated retinæ. He has also observed them in the iris and the anterior chamber. Among this group of gouty affection is to be placed episcleritis fugax.

A second group consists of eye affections which are only indirectly caused by gout, the connecting link being fur-nished by circulatory changes, *e.g.*, atheroma. In this group are assigned hæmorrhages in the vitreous and in the retina, and corneal inflammations of a "sclerosing" type, which are probably due to vascular changes.

In two cases he had observed a connection between gout and glaucoma.

A. DARIER (Paris). *Local Treatment of Iridochoroiditis, Sympathetic Ophthalmitis, &c.*—Darier is as warm an advo-cate of the practice of subconjunctival mercurial injec-tions as ever; but he admits that there are certain cases, both of primary iridochoroiditis and of sympathetic disease, which terminate in blindness in spite of transient

amelioration under the treatment. He does not hesitate now to perform enucleation immediately in cases of actual or imminent " sympathy."

In severe cases of iridochoroiditis of various origin, with exudation in the anterior chamber, he now performs paracentesis as an adjuvant to subconjunctival injection, or in combination with washing out the anterior chamber with a mercuric salt, preferably cyanide, of the strength of 1 to 2000. Three cases are described in detail where paracentesis and subconjunctival injections effected cures.

In the discussion Pflüger mentioned that he believed he had been the first who had systematically practised this method of treatment, and though he had had failures with it he still was a thorough believer in its efficacy.

L. WEISS (Heidelberg). *Bridge-shaped Conjunctival Flaps in Extensive Corneal Ulceration with Prolapse of Iris.*—Weiss has transplanted bridge-shaped conjunctival flaps with excellent results even when the surface upon which they were fixed was the infiltrated floor of an injected ulcer, and when more than the half of the whole cornea was destroyed by suppuration.

In the discussion Schanz stated that he had had long and favourable experience of the utility of conjunctival transplantation in cases of wounds and ulcers of the cornea. The method he adopted was that of Kuhnt.

ALEXANDER (Aix la Chapelle). *Restoration of Function in a Case of Embolism of Central Artery of Six Years' Standing.*— The patient whose case is described was a middle-aged man with cardiac hypertrophy. He came under observation with a recent embolism of the central artery of the retina, and the history of an embolism of six years' standing in the other eye. While under observation the sight returned to the eye which had been six years blind, and the retinal vessels gradually regained their normal size and pulsated on pressure. The reaction of the pupil to light also returned. The more recently affected eye remained unaltered.

Alexander, in commenting on the case, lays stress upon two propositions :—(1) the original blocking of the central

vessels must have been only partial ; (2) the blood supply, though insufficient to keep up the functional activity of the retina, must have been enough to prevent actual degeneration. He suggests that the exhibition of digitalis in this case had supplied a sufficient *vis a tergo* to force the blood past the organised embolus in quantity enough to restore an almost normal function to the retina.

According to Wagenmann, there are three ways in which the return of the circulation may be brought about after an embolism : (1) the embolus becomes diminished by the contraction of the wall of the vessel ; (2) contraction in the interior of the embolus produces a partial opening of the vascular lumen ; (3) the vessel itself enlarges from paralysis of its wall. None of the three suppositions seem to exactly account for the case described.

In the discussion Wagenmann suggested that the third of his suppositions would explain Alexander's case.

FUKALA (Vienna). *The Estimation of the Higher Degrees of Myopia*.—On optical grounds Fukala advocates the following proposals. In myopia up to 8 D. we need take no account of the distance of the correcting glass from the eye. In myopia above 8 D. a standard distance of the glass from the eye should be assumed, which distance Fukala suggests should be 10 mm. If any other distance be taken it should be definitely recorded. The distance of the glass should be measured from the apex of the cornea, as this is a point which can be seen, as cannot either the nodal point or the principal point.

HUGO WOLFF (Berlin). *Advancement of the Levator Palpebræ Superioris with Division of the Tendon*.—The operation consists in exposing the tendon from the conjunctival surface of the everted lid, excising a sufficiently large portion of it, and suturing the divided ends. Wolff has found it more satisfactory in all varieties of ptosis than any of the numerous other operations which have been invented. For an exact description of the operation we must refer those interested to the original.

J. B. S.

EMIL V. GRÓSZ (Budapest). The Origin and Significance of Papillitis in Intracranial Tumour. *From an Abstract, February,* 1897.

In a paper based on the histological examination of three cases of tumour of the brain, and on the analysis of the writings of some of the many authors who have dealt with this subject, v. Grósz expresses his views on the pathogenesis of papillitis, as follows :—The papillitis of intracranial disease should be considered in two groups : (1) those cases in which it is due to obstruction to the circulation ; (2) those in which it is primarily an inflammatory process.

This difference in origin was taught by v. Graefe, and the author's contention is in support of v. Graefe's views.

V. Grósz holds that in cases of *tumour* of the brain the papillitis is caused by obstruction to circulation—in other words, that the condition is one of " choked disc ; " that in cases of tubercular or gummatous intracranial lesion the condition is one of genuine inflammation. He thinks that in the early stages the ophthalmoscopic appearances in the two classes are sufficiently characteristic to enable a differential diagnosis to be made. In the first group (obstruction cases) the papilla, though sharply prominent, remains fairly transparent, the veins are greatly distended ; in the second (inflammatory cases) the veins are obscured by exudation, and the inflammatory signs extend into the surrounding retina. Visual acuity in the choked disc cases is but little, if at all, impaired in the early stage ; in the other group it fails quickly. In the later stages these distinctions cannot be demonstrated.

On the question of the localisation of brain disease by the aid of papillitis, the author has nothing new to suggest.

In conclusion, v. Grósz pleads in favour of palliative trephining of the skull in cases of severe papillitis in brain tumour. He thinks it has been conclusively shown by published cases that, even if the tumour cannot be removed, the effect of opening the skull is not injurious to the patient, and is markedly beneficial to the optic nerves.

J. B. L.

STRZEMINSKI (Wilna). Ocular Lesions in Acromegaly. *Arch. d'Ophtal.*, *February*, 1897.

The author records three cases, observed by him during eleven years.

CASE I.—Male aged 34, seen in April, 1889. Family and personal history good. For four years he had noticed enlargement of the extremities, followed by a similar change in the face ; for two years he had had visual defect, which was steadily increasing.

The ordinary signs of the disease were very well marked, and as symptoms there were cephalalgia, vertigo, and general enfeeblement.

Ocular Symptoms.—The orbital margins were noticeably enlarged, and eyebrows thickened. Pupils equal, but dilated, reacting feebly to light, normally with accommodation and convergence. Perimetric examination revealed bilateral temporal hemianopia, the dividing line passing accurately through the point of fixation. Perception of colours was abolished, except for blue, and for this the limits, in the retained portion of the field, were narrowed. Visual acuity was in the right eye $\frac{2}{10}$, and in the left $\frac{3}{10}$. The optic papilla in each eye was atrophic, bluish white, sharply outlined, with shrunken arteries and full sized veins.

CASE II.—Male aged 23, came under care May 11, 1894. Family history good. Patient addicted to excessive use of alcohol. The general signs of acromegaly were well marked. Vision had been progressively failing for two years.

Ocular Symptoms.—Pupils equal and dilated. The left reacted very feebly to direct illumination, but briskly when

Ophth. Review. Vol. XVI., No. 185, March, 1897.

6

the right eye was exposed. The right pupil reacted normally to light. Both contracted well during convergence. The visual field of the left eye showed concentric contraction, the loss being greatest on the temporal side. Colour vision was defective—violet, green and red not being recognised. V. $= \frac{2}{10}$. The optic papilla was atrophied, white, sharply defined with normal vessels. The field and colour vision of the right eye were normal, as was its visual acuity. The optic papilla showed some pallor.

CASE III.—Male aged 36, came under observation June 2, 1896. Family and personal history good. Symptoms of acromegaly had been developing for six years, and were attributed by the patient to a severe injury to his head, followed by vertigo and transient defect of sight.

Ocular Symptoms.—Orbital margins enlarged, eyebrows overgrown. Pupils unduly wide, reacting feebly to light stimulus, normally with accommodation and convergence. Contraction of the fields of vision, most on the temporal side of each, where the contraction amounted to $25°$; least on nasal side, where it was only $6°$ to $8°$ within the normal limit. Perception of colours normal, but colour fields narrowed similarly to the fields for white. V. with correction of myopia $= \frac{9}{10}$. The optic papillæ were greyish, with ill-defined borders, and the arteries perhaps slightly diminished in calibre. At two subsequent examinations the papillæ appeared less abnormal.

None of the cases had terminated fatally at the time of writing.

The literature of acromegaly shows that ocular complications are frequent in this disease, and they have a distinct value in diagnosis. In osteo-arthropathy, the disease most likely to be mistaken for acromegaly, ocular symptoms are practically unknown. Marie's opinion that blindness towards the end of the case is characteristic of acromegaly has not been wholly borne out by subsequent records.

The ocular lesions commonly met with are temporal hemianopia and optic nerve atrophy, the hemianopia frequently being lost in progressive atrophy. Optic neuritis

is a rare complication. Paralysis of the third nerve is sometimes found; the sixth is said never to be involved. Partial or complete loss of the pupillary reaction to light is an occasional symptom. Exophthalmos was recorded in 17 of 91 cases, but in slight degree is probably present in a larger proportion of cases.

Hertel,[1] writing upon the relation of acromegaly to eye disorders in 1895 (see OPHTH. REVIEW, 1895, p. 177), gave a complete bibliography of the subject, with an analysis of the previously published cases. Of the whole number, 174, ocular complications were present in 91. To these Strzeminski adds 19 cases published since Hertel's paper, which, with his own 3, make a total of 113 cases of acromegaly in which ocular symptoms were described. References to these records are given by the writer.

Although the etiology of acromegaly is as yet undecided, no one of the various hypotheses being generally accepted, the causation of the ocular complications is left obscure. The hypertrophy of the pituitary body, and more especially of its anterior part, must exercise pressure on the posterior angle of the chiasma, inducing a temporal hemianopia, usually bilateral. *Post-mortem* evidence of this has often been obtained. A further overgrowth of the gland may lead to compression of the optic tracts, followed by wasting, shown ophthalmoscopically by atrophy of the optic papillæ. In instances in which such atrophy is not preceded by hemianopia, it is reasonable to suppose that pressure is from the first exerted upon the whole chiasma or on the tracts.

Several writers have attributed the compression of the chiasma and optic tracts to hypertrophy of the bone at the base of the skull, chiefly in the sella turcica, and Broca believed there was a narrowing of the optic foramina, and consequent pressure on the nerves, from a condition of hyperostosis. These suggestions have not been found to apply to most of the cases.

The ocular symptoms in acromegaly are identical in

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[1] *Arch. f. Ophthal.*, bd. xli., abth. 1, p. 187.

many respects with those found in tumours of the pituitary body; in these latter cases temporal hemianopia and optic atrophy are the most frequent symptoms; optic papillitis, so common in tumours of the cerebrum, is seldom met with. The oculo-motor (third) nerve commonly suffers, the sixth nerve but rarely.

In cases of acromegaly in which no hypertrophy of the pituitary body takes place, the cause of ocular complications, according to Arnold's views, is to be sought for in the peripheral portions of the optic and third nerves—hypertrophy of connective tissue and atrophy of nerve tissue—changes which are identical with those shown to occur in other nerves and in the nerve centres.

J. B. L.

DA GAMA PINTO (Lisbon). Operative Treatment of Secondary Cataract. *Annales d'Oculistique, January,* 1897.

Da Gama Pinto has performed discission 326 times, *i.e.,* in 61 per cent. of the cases in which he has performed extraction. In two cases it was followed by suppuration. He does not always wait for the capsule to become opaque, but needles even when it is quite smooth and transparent, knowing that it is probably only a matter of a few weeks or months before opacity sets in. Moreover, to hospital patients it is of great importance not to be put to the expense and delay which are involved in returning for a second operation. Therefore, in hospital practice he performs discission after nearly every extraction, though of course there are some necessary exceptions. In private practice, too, he finds that patients, when the alternative of immediate or remote discission is put to them, prefer to have it done at once.

It need hardly be insisted that discission implies exact and definite cutting with a proper instrument, and not merely making any sort of tear in the capsule. For this purpose he prefers a Graefe's knife, and always operates by artificial light concentrated on the pupillary area. The patient is seated on a chair with his head against the chest of an assistant who illuminates the field. The pupil is dilated with atropine. The operator places himself in front, and enters the knife in the cornea 2 mm. from the limbus ; its point is then directed towards the opposite pupillary margin, and the capsule is cut by to-and-fro movements. One must never begin to cut before having traversed the capsule with the point of the knife ; to avoid cutting the cornea and sclerotic the back of the knife is supported against the corneal wound, and as the hand is raised a movement to and fro is executed. In withdrawing the knife some aqueous escapes, sometimes also a little vitreous. The former is advantageous, because it favours the separation of the margins of the capsular incision.

Knapp recommends the section to be made in the softest and most transparent parts of the capsule, avoiding any resisting part. Da Gama Pinto thinks that a properly sharpened knife easily overcomes, without dragging, any resistance likely to be met with in recent secondary cataracts. Rather he notices the direction of greatest tension of the capsule and makes his incision at right angles to it ; when there is a posterior synechia this indicates the line of tension. The capsular opening is in general made vertical or oblique, rarely horizontal. It sometimes happens that when the membrane is thin and without synechiæ the incision does not gape at all, or very slightly. *À propos* of this he mentions a case in which he did an early discission at the patient's desire, although vision was good ; as a result the margins of the capsular wound became thickened and cloudy, and vision much worse. A second discission with two needles succeeded. In another case the capsular wound did not gape, so he depressed one of the lips of the corneal wound with a spatula to allow some aqueous to escape ; the lips of the capsular incision then separated.

The after-treatment is of short duration. Three or four days after the operation the dressings are left off, and a week later glasses are ordered. If there is any reaction on the part of the iris or ciliary body it is combated by the ordinary measures—hot compresses, atropine, sod. sal., &c.

Once a good opening is obtained by discission it remains clear and open.

One of the most disagreeable complications is the entanglement of vitreous in the corneal wound. (He has never seen capsule adhering to the cornea ; what has been taken for capsule is, he thinks, a thread of vitreous.) It provokes lively reaction, lasting some days ; should the thread of vitreous project and hang out through the wound the reaction is still more vigorous. Any projecting thread should be cut off with scissors level with the cornea. Out of 193 discissions he got adherence of vitreous to cornea in nine cases ; of these five passed off without ill effects ; in two hypopyon followed and an infiltration of the vitreous, but the final result was good. The two other cases ended in suppuration and the loss of the eye.

The effect of a tag of vitreous passing over the pupillary margin may be to displace the latter a little towards the corneal scar, as can sometimes be seen by oblique illumination.

In April, 1894, da Gama Pinto modified his method of operating, placing his point of incision not in the cornea, but in the sclerotic (posterior discission), as there the danger of infection is less owing to the covering which the conjunctiva affords. The patient sits in a chair as before described, and the operator stands in front when the left eye is to be operated on, behind when the right eye. The capsule is divided by a single incision, usually oblique— downwards and outwards. The globe is fixed with forceps, and the Graefe's knife entered 6 or 8 mm. from the corneal margin, the blade in the direction of the meridian, edge backwards, the point being directed towards the centre of the globe. When the eyes are very sunken the puncture

is made near the limbus, when prominent, further back.
If one keeps 6 to 8 mm. from the cornea, the knife is
sure to pass outside of the ciliary muscle and to invade
the ciliary circle; a wound of the ciliary body would not
cause much trouble (?). Having made the puncture, the
handle is depressed and the point of the knife directed
towards the pupillary border of iris on the same side and
the secondary cataract is transfixed from behind forwards;
the handle is now raised a little and its point pushed,
parallel to the surface of the capsule, to the opposite
pupillary margin. Here the contra-puncture in the capsule
is made, from before backwards, and the section is com-
pleted by to-and-fro movements. In withdrawing the
knife, the point should keep the same direction as when
entered. At this moment there may be an insignificant
escape of vitreous, which gets immediately covered by the
conjunctiva when the fixation forceps are taken off.

The operation with Graefe's knife in the case of sunken
eyes may have this inconvenience, that when the handle is
lowered the cutting edge may wound the palpebral angle
or margin. This can be obviated by having a special blade
made, in which the cutting margin is only 12 mm. long.
Da Gama Pinto has performed this operation 133 times.
These, added to 193 anterior dicissions, give a total of 326
discissions out of 529 cataract extractions, *i.e.*, 61·6 per cent.
Of these extractions 210 were done without iridectomy.
The majority of posterior discissions were performed on eyes
in which no iridectomy had been done. The opening in
the capsule obtained by posterior discission suffices perfectly
for distinct vision. He has had no suppuration, and no
infection of the scleral wound. Irritation phenomena, such
as ciliary injection, pain, &c., are not rare, but yield quickly
to treatment. Pinto does not claim originality for the
operation, only for making its use a matter of routine.
Usually he does it at the beginning of the fourth week
after extraction, provided the eye shows no trace of
irritation.

As regards the optical results, of the 193 anterior discis-
sions, 107 showed immediate improvement, whereas in 20

the vision was impaired. Of the 133 posterior discissions, 95 showed improvement, 7 impairment.

As regards glaucoma, he observed it 3 times after anterior, and 3 times after posterior discission ; 3 of these recovered under the use of eserine, 2 underwent iridectomy ; in the other case iridectomy was refused by the patient. From this it appears that glaucoma after needling cannot be attributed to a corneal traumatism during the operation, as Pagenstecher is inclined to think, for, after posterior discission, in which the cornea is not touched, it has been as frequent as in other procedures.

W. WATSON GRIFFIN.

F. C. HOTZ (Chicago). Cicatricial Skin Flaps for Ectropion of the Upper Lid. *Transactions of the Ophthalmological Section of the American Medical Association*, 1896.

Hotz has previously pointed out the superiority of Thiersch's skin grafts over the thick skin flaps usually employed in the operations for ectropion of the upper lid. But occasionally the skin flaps taken from the vicinity of the everted lid possesses all the conditions necessary for a perfect cosmetic result. He had in mind the thin, glistening, cicatricial skin, which usually covers the vicinity of the everted upper lid. In several cases where the eyebrows had been destroyed to such an extent that a large flap could be cut from this cicatricial skin above the lid, he used such skin as a substitute for the lost lid skin, and found that, contrary to the general belief, these flaps could be transplanted as successfully as the flaps of normal skin, and that their use has several decided advantages over all other methods of transplantation.

He reports a case in which a cicatricial skin flap was used in a boy, aged 14, who suffered from complete ectropion of the upper lid of the left eye and lower lids of both eyes, the result of extensive caries of the orbital margins, when the boy was 4 years old. The reposition of the lower lids was accomplished by the well-known V-shaped incision combined with Arlt's operation for shortening the over-stretched lid border.

The border of the everted upper lid of the left eye was drawn up and fixed to the temporal portion of the supra-orbital margin, and above it a large stretch of cicatricial skin extended far into the frontal and temporal region. The temporal half of the eyebrows had been destroyed, rendering the operation feasible.

From a point near the inner canthus an incision was carried obliquely upward past the end of the eyebrows, well up into the cicatricial skin above the supra-orbital margin, and then continued at a considerable distance from the lid border in a curved line downward to a point about six millimeters outside the external canthus. The large skin flap mapped out by this incision was carefully dissected from the underlying scar tissue down to the lid border, with which it was left connected. The lid, then, was released from all cicatricial adhesions and replaced in its normal position.

The cicatricial skin flap shrank considerably as soon as it was detached from its basis, but in anticipation of this contraction it had been cut so large that, after shrinking, it was still sufficient to cover the whole lid. It was spread out over this surface and its margin fixed to the upper border of the cartilage by four sutures.

The large wound above the lid was covered by sliding into it a skin flap from the temporal region, its margin being united with the margin of the new lid skin. This flap also contained a great deal of scar tissue. The small wound remaining at the temporal side of the transplanted flap was left to heal by granulation.

This operation supplies the replaced lid with a thin and light skin which adapts itself nicely to the configuration of

the lid and does not restrict its movements. In this respect it is fully equal to the Thiersch grafting, over which, however, it has the advantage that the lid need not be rendered immobile for a number of days by sutures or ligatures.

But the most important advantage of this operation lies in the fixation of the new lid skin to the tarsal cartilage. This fixation renders the skin independent of all tissue changes which may take place in the supra-tarsal region. No amount of shrinking of the transplanted flap in this region can cause a re-eversion of the lid, because the firm union of the skin with the upper border of the tarsal cartilage makes its absolutely impossible that the contraction of the supra-tarsal tissues could affect the lid skin and the lid border.

E. J.

J. HERBERT FISHER (London). A Case of Subhyaloid Hæmorrhage, in which the Specimen was obtained, with Microscopic Sections. *Royal London Ophth. Hosp. Reports, Dec.*, 1896.

The chief interest of this paper lies in the fact that it goes far to settle the vexed question of the exact situation of subhyaloid hæmorrhage in relation to the retina and hyaloid membrane.

The patient died from cerebral hæmorrhage while the ocular condition was still under observation, and the eye was obtained *post-mortem*, and sections cut at the site of the lesion. Drawings of one of these sections under two different powers are added to the text.

The author begins his paper with a short review of the different opinions held by various authorities as to the precise site of these hæmorrhages. We may pass them

over without comment, inasmuch as they have frequently been noted elsewhere ; moreover, they are all founded on clinical evidence alone, and, therefore, do not carry very much weight.

The following is a brief outline of the patient's medical history : A woman, 60 years old, came under Mr. Lawford's care at St. Thomas' Hospital for the first time on April 30, 1895. The sight of her right eye had failed suddenly some ten weeks before, while she was doing laundry work. She had had several severe attacks of bleeding from the nose during the month preceding her visit to the eye department.

The note of the eye condition on April 30 is as follows : —" R. sees hand dimly, but cannot count fingers. Pupil slightly greater than left ; acts to light. L. $+ 5$ D. $= \frac{6}{9}$ partly $+ 9$D. $= 1$ J. at $10\frac{1}{2}$ inches. *Ophthalmoscopic Examination.—Right Eye.*—In the macular region is a large, roughly semi-circular subhyaloid hæmorrhage ; its upper border on a level with the centre of the O. D. is horizontal, sharply defined and grey ; its lower border is less regular, and, in part, has a fringed appearance ; the retinal vessels in relation with the extravasation are completely obscured. Below the main patch, and in connection with the inferior macular vein, is another patch of extravasated blood, less sharply defined, and much smaller than the central one ; fundus in other parts is apparently healthy."

She was seen from time to time during the next month, but no change of importance is mentioned in the notes of these visits.

On May 28 the note runs :—" The upper edge of the hæmorrhage is very straight and sharp, and above it is a broad, whitish band, also with a sharp border. The extravasation looks generally less dense than at her first visit a month ago. At the macula is an irregular hæmorrhage, annular in form, which appears deeper than the larger hæmorrhage. The separate hæmorrhage at the lower part of the fundus has altered but little."

Just as the ophthalmoscopic examination was completed, the patient was struck down by a cerebral hæmorrhage and died two or three days later.

The right eye was excised, hardened in a 10 per cent. solution of formol for four weeks, and then frozen and divided equatorially. The hæmorrhage was obvious to the naked eye as a reddish patch in the macular area. The posterior half of the globe was embedded in celloidin and sections cut and stained with hæmatoxylin and eosin.

In the section which is reproduced, and which the writer tells us is typical of them all, a large extravasation of blood is seen to be lying in the anterior part of the retina immediately *behind* the internal limiting membrane. Two delicate membranes are seen to run from end to end of the section ; they are separated from each other by a narrow interval and are practically parallel in the greater part of their course. The anterior of the two is structureless in character and is obviously the hyaloid membrane of the vitreous ; the structure immediately behind has nucleated cells in connection with it, and is, of course, the internal limiting membrane of the retina. Both membranes are, for the most part, on the surface of the extravasated blood, but at one point blood corpuscles have found their way between the two, and have caused a wider separation one from the other than elsewhere. Evidently the internal limiting membrane has given way before the pressure of the effused blood, but the hyaloid has here remained intact and prevented the escape of blood into the vitreous.

There is a part, however, towards the end of the section farthest from the optic disc where both membranes have been ruptured and the blood can be seen lying in a thin layer on the anterior surface of the hyaloid. It is a noteworthy fact to which the writer draws special attention, that the layers of the retina are not infiltrated even at the point where both internal limiting membrane and hyaloid have given way : in other words, the blood has found it easier to separate these membranes from the retina and even to perforate them than to penetrate backwards into the true retinal tissue.

There is no means of judging from the sections as to which of the retinal vessels has given rise to the hæmorrhage. General opinion has recently been veering round

to the view that subhyaloid hæmorrhages are derived from the veins, but Fisher doubts whether the pressure from such a source would be sufficient to tear off the internal limiting membrane from the retina, and thinks it more likely that the bleeding may be due to rupture of a minute artery. " In the situation in which the blood is seen," he says, " spontaneous arrest of hæmorrhage from a small arteriole might well be expected."

Clinically this case appeared to be a typical one of subhyaloid hæmorrhage, and it seems a fair inference to assume that the pathological condition, as revealed in the microscopic sections, is also representative of what usually occurs. If so, the discussion as to the exact site of the hæmorrhage in these " subhyaloid " cases may be considered at an end.

N. M. ML.

S. C. AYRES (Cincinnati) with ALT (St. Louis). A Case of Chloroma, with Microscopic Examination. *American Journal of Ophthalmology*, *xiv.*, 3.

Ayres reports the case of a boy, aged 7, his parents living, with five other children, all healthy. He never suffered from serious illness, but had repeated attacks of parotitis. He first complained of pain in both orbital regions, and at the same time both eyes seemed to be more than usually prominent. After a week or more his mother noticed some impairment of his hearing, which slowly got worse. The exophthalmos increased more rapidly. He became very weak and somewhat emaciated, and complained of a severe pain in the left foot, on account of which he was unable to walk.

Upon admission to the hospital both globes were very

prominent, but the right more so than the left. It was with difficulty that he could close the lids of the right eye over the ball. The corneæ were clear and there was no impairment of vision. The conjunctiva of both eyes was red and chemotic. The mobility of the eyes was unimpaired. In the upper and outer portion of the right orbit could be felt a dense, inelastic growth, which protruded beyond the edge of the bone. A similar growth could also be felt in the left orbit, but it was not so pronounced. The optic papillæ were somewhat pale ; there were no other alterations in the fundus of either eye. His hearing was so much impaired that he had to be spoken to in a loud voice. Pulse 120 per minute ; temperature, normal. There was no lesion of any of the cranial nerves. Muscular power and sensation of both upper and lower extremities normal. Pressure on the sole of the left foot produced pain, but there was no redness or swelling in this locality.

In five days protrusion of both eyes increased ; corneæ hazy and covered with inspissated mucus; a swelling in temporal region. Four days later both corneæ were quite opaque. The swelling in the temporal regions was more marked. There had developed a hard, firm swelling in the region of each parotid gland. The exophthalmos of both eyes increased day by day ; the globes were forced beyond the palpebral fissure. Nine days afterwards he died, as a result of hæmorrhage from the conjunctiva of the right eye.

The examination of the blood justified the diagnosis of leucocytosis only, and not leukæmia ; furthermore, an examination of the patient revealed no enlargement of the lymphatic glands except those of the neck.

Post-mortem examination showed : both eyeballs protruded to such an extent that they were only partly covered by the eye-lids ; there was sloughing of both corneæ. On removing the brain the orbital plates were seen to bulge upward owing to the pressure from within. After removing the very thin orbital plates, both cavities were found filled with a firm, solid, and somewhat elastic mass of a light greenish colour, which pushed the eyeball forward. This mass was

removed with some difficulty, although only at one point did it seem to be firmly adherent to the periosteum lining the orbital cavity. Here the bone was somewhat eroded. Behind, the new growth extended to the sphenoidal fissure, surrounding but not involving the optic nerve. In front and above, the newly formed tissue extended to and a little beyond the orbital arch. On superficial examination the new growth seemed to be confined to the orbital cavities, but a further examination showed this not to be the case, for the cancellous tissue of the sphenoid and the petrous portion of the temporal bones were softened and infiltrated with a dirty greenish-yellow fluid, looking very much like pus.

Arlt examined microscopically two pieces of growth, one larger and of firmer consistence than the other. Both were of dark grass-green colour. In unstained sections the tissue was found to consist chiefly of small and larger round cells containing fat globules, although in one part of the tumour fibrous tissue predominated. The round cells seemed to lie rather loosely together and were held by an inter-cellular substance which was hardly visible. Between these round cells, which all had a greenish tint, there lay aggregations of varying sizes composed of larger and darker bodies which were totally filled with, or altogether consisted of, small fat or oil globules. Their shape was not exactly similar to any cell. These bodies were much more numerous in some parts of the tissue than in others. The tissue took up all the different kinds of staining materials but poorly, and nuclei could not be demonstrated.

The preserving fluid (formalin solution) was found to contain innumerable fat globules, and octahedric crystals of perfect purity, but varying in size, in no way different from crystals of oxalate of calcium as found in the urine.

According to Dock (*American Journal of Med. Sci.*, *August* 1893), the important points in the diagnosis are :—The appearance, usually below the age of 20, of anæmia without evident cause, with loss of strength, dyspnœa and emaciation : hæmorrhages in the skin, mucous membranes, (epistaxis), or internal organs (retina) ; rapid pulse ; ocular

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symptoms, such as difficulty of vision, strabismus and especially exophthalmos, without the special features of Basedow's disease, and with tumour in the orbit ; deafness and ringing in the ears ; and tumours under the temporals, or on the cranium in other parts, or in other parts of the body. Before the appearance of tumours the diagnosis would be doubtful, but after the appearance of tumours in the orbit and under the temporals, it could be made almost with certainty. Dock was able to find but 17 reported cases including his own.

E. J.

E. VALUDE. Interstitial Keratitis in Acquired Syphilis. *Annales d'Oculist., January,* 1897.

The writer records the following case : Mr. X., aged 30, had in 1891 an indurated chancre at the internal angle of the left eye. The diagnosis was confirmed by roseola and the ordinary train of secondary symptoms. For two years the patient was treated with protiodide pills and Van Swieten's solution. The secondary symptoms had been absent for some time when, towards the middle of September, 1895, the left eye became irritable, and the patient noticed some little white spots appear on the cornea, and these increased in number and extent, in spite of mercurial and iodide treatment. It was on November 25, 1895, that he came under Valude's observation, when the condition is thus described. The cornea has lost its brilliancy and has the aspect of parenchymatous keratitis. In almost its whole extent there are whitish islets with

indistinct limits and in the upper and lower periphery some of these spots show a tendency to vascularisation. There is moderate photophobia and slight watering. The right eye is not affected. The general health is good, there being no other sign of syphilis. Subcutaneous injections of cyanide of mercury were ordered — ·01 centigr. in 1 gr. of water every two days. After the third injection it became evident that the malady, which had progressed during two months in spite of iodide and mercurial friction, was giving way ; the area of vascularisation had not increased. By January 22, 1896, twenty injections had been made. There was no longer any trace of vascularisation ; and the white diffuse interstitial spots were separated by spaces of clear cornea. Vision had improved, though he was still unable to read with that eye. Injections were continued, alternating with pills of protiodide ; at the same time iodide of potassium, 1 gr. 50 centigr. to 2 gr. a day was given. The patient returned to the province where he lived. He was again seen on August 10, 1896 ; there now remained only some little central islets of opacity which did not much affect the vision, reading of ordinary print being possible. The right eye has remained unaffected, and there has been no other sign of syphilis. When last heard of, all traces of the keratitis had disappeared. The affection lasted about a year, from its first outbreak to its disappearance.

As characteristic of acquired syphilitic keratitis are to be noted : its unilateral occurrence (four times out of five, according to Haltenhoff ; nine times out of eleven, according to Trousseau) ; the slight tendency to vascularisation, perhaps owing to the rapid effect of treatment ; this beneficial effect of specific treatment is also characteristic. Trousseau has seen the affection run its course in from five weeks to three months. The absence of vascularisation accounts for the slight degree of photophobia and watering. Prognosis is much more favourable than in hereditary keratitis of an equal intensity ; unfavourable issues have, however, been recorded by Alexander and by Symons.

This acquired diffuse interstitial keratitis must not be

confounded with syphilitic punctate keratitis complicated
with iritis. In this latter malady, it is the iritis which
plays the principal part ; moreover, the sharply defined
spots of opacity in the cornea are not interstitial and do
not resemble the diffuse opacity of the interstitial form.
There is also a partial interstitial keratitis which compli-
cates iritis (syphilitic) ; it is triangular in shape, and
situated in the upper or lower parts of the cornea. Here
again the iritis preponderates.

W. WATSON GRIFFIN.

S. SNELL (Sheffield). On Certain apparently Or-
ganic Tumours of the Orbit, which disappear
under Medical Treatment. *Lancet, Jan.* 23, 1897.

This paper is worth drawing attention to : it brings home
the useful practical lesson that in cases of orbital tumour
the proper mode of treatment is to try drugs before resort-
ing to the knife.

Snell refers particularly to a class of tumours occur-
ring in middle life and very closely simulating malignant
(sarcomatous) growths, so closely indeed that it is often
impossible at first to distinguish them.

He gives notes of three such cases which have been
recently under his care. If we describe one of these it
will be sufficient to indicate the class of case to which
he alludes.

A woman, aged 40, was sent to him on November 20,
1895, because of a prominence of her left eyeball, due, it
was feared, to the presence of an orbital tumour. Proptosis
was noticed for the first time only about three months

before and had recently rapidly increased. Prior to this, however, she had suffered much from left-sided headache. Examination showed that the left globe was definitely protruded, but the movements of the eye were not interfered with. The upper eyelid was redder than normal and a little œdematous. A tumour could be felt at the outer part of the orbit ; it was most obvious on the floor of the cavity, and extended towards the inner side, and it could also be felt between the globe and the orbital roof ; it projected as a rounded, moderately hard growth over the edge of the bone, but the tissues in the immediate neigh-bourhood of the orbit were not apparently implicated ; the growth was sensitive to pressure. There was nothing in the condition of the fundus to indicate interference with the intraocular circulation. Vision was full.

The patient had been married for twenty-three years, and had a son aged 21. The only point in her history which justified the least suspicion of syphilis was that many years ago she had had miscarriages.

The opinion that the case was one of extensive orbital growth necessitating thorough removal and sacrifice of the eye was freely expressed, but Snell's previous experience of orbital tumours disappearing under iodide of potassium induced him to recommend a fair trial of this drug before going farther. She began with five-grain doses and in-creased it to sixty grains daily. On December 24, *i.e.*, just over a month after her first visit, Snell again saw his patient, and noted that " the proptosis had nearly gone, and there was apparently little difference between the two eyes, but along the lower border of the orbit the edge of the tumour could be just felt, much reduced in size, but still a trifle tender to the touch." On February 11, 1896 —two and a half months after the iodide was begun—the note is, " there is nothing to notice in the appearance of the eye as different from the other: the finger, passed along the lower and inner wall of the orbit, could no longer detect any tumour."

The writer draws attention to the very close clinical resemblance of these tumours to growths undoubtedly

sarcomatous. There is the same moderately hard semi-elastic feel common to both ; they do not fluctuate or pulsate, and the surface is nodular. With regard to their nature, the simplest way of course is to class them as syphilitic, and to discount the absence of specific histories. The mere fact that the disappearance of the growth followed the use of iodide of potassium will be accepted by many as sufficient proof of their syphilitic origin. Snell, however, protests against the too ready acceptance of this assumption, and we confess we are cordially in agreement with him. The habit of writing down as syphilitic every-thing which cannot conveniently be called anything else palls on one at last, and might well give place to a more reasonable and scientific line of thought. Snell refers to a paper by Panas, read before the British Medical Associa-tion of 1895, in which he deals with " pseudo-malignant " tumours of the orbit (a rather unfortunate name it seems to us), some of which were dispersed after the administration of iodide of potassium, and some apparently much reduced by the use of arsenic and other drugs. Panas' conclusions, therefore, tally closely with our author's, in that he believes that there is a class of orbital tumours which disappear under medicinal treatment, which are not malignant, and have not yet been clearly proved to be syphilitic.

N. M. ML.

TREACHER COLLINS (London). Case of Per-
manent Central Scotoma caused by looking
at the Sun, with Partial Atrophy of the Optic
Nerve. *Royal Lond. Ophthal. Hosp. Reports, December,*
1896.

Collins records this case because it differs in some
important points from any which have hitherto been
described. He refers to Mackay's paper in this journal,[1]
in which a *résumé* is given of the literature of the subject,
and a careful description of seven new cases added ; in no
instance was the loss of sight nearly so great as in Collins'
patient, and in none is there any history of resulting optic
atrophy as in his case.

A schoolmistress, aged 49, exposed her eyes for a pro-
longed period—five to ten minutes—to direct sunlight in
her interest in watching a rainbow-coloured halo surround-
ing the sun which was observed in the early part of May,
1889. The time was about four or five o'clock in the
afternoon. Now and then she shaded her eyes with her
hand, but otherwise they were unprotected. Immediately
afterwards she saw two yellow discs against the green
background of grass, the right a complete circle, the left a
circle with a notch in it. Against a white tablecloth in a
moderately darkened room the colour of the discs changed
from yellow to blue. The next day the discs were hardly
noticeable, and by the third day they had disappeared.
But then she began to notice " cobwebs " before her eyes,
and in school the children's faces at seven or eight yards'
distance seemed to have a blot on them. At the end of a
week she says, " the sight of the left eye had gone," but
apparently light perception was never lost. The right eye
recovered completely in from three to four weeks.

The condition of the left at the end of June—about six
weeks after the injury—was that " on looking at an object
with her left eye it appeared enveloped in a fog, and
seemed to have irregular-shaped blanks in it, though she

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[1] OPHTHALMIC REVIEW, January, February, March, 1894.

was able to make out its lower part." The patient is clear that no defect of either eye had ever been noticed before their exposure to the sun. There was no oscillation or movement of the coloured discs, and no apparent bending of straight lines.

She went to Moorfields Hospital on October 4, 1889, when the note is as follows :—" V. : R. $= \frac{6}{18}$; L. = fingers at three feet; has a large central scotoma in the left which cannot be mapped out. Both fields for white are slightly contracted; in the centre of the left, white objects can only be seen with difficulty; red and green are quite invisible.

"*Ophthalmoscopic Examination*.— The left disc is paler than the right, and is somewhat cupped. The edges of the right disc are blurred, and there are some slight changes about the right macula resembling central guttate choroiditis."

She returned to Moorfields in January, 1895, when Collins saw her for the first time. The condition at that time was : R. V. $= \frac{6}{18}$ $c-$. — $1 = \frac{6}{6}$ $c-$. $+$ 1 = J. 1. L. V. = fingers at three feet. Visual field of each full. Definite central left scotoma for red, and an uncertain scotoma for white. She says the white patch comes and goes, and the scotoma cannot therefore be defined with the perimeter. A 15 mm. green square was not recognised as such in any part of the field, but the colour of a skein of green wool could be seen in the lower part. She recognised blue except at the centre, but described a yellow 15 mm. square as white throughout the field. The left optic disc was pale and the outer half markedly white. No diminution in size of retinal vessels. One small shining white spot could be seen immediately below the fovea, which otherwise was normal. In the right eye disc and retinal vessels were healthy. A few white dots were seen in the macular area.

In Mackay's summary of cases of this nature the most marked depreciation of sight occurred in a man whose vision was only $\frac{1}{20}$ four days after exposure to the sun. Three weeks later it improved to $\frac{1}{2}$, so that the eye had

presumably been a good one before. In Collins' case vision had sunk in the left eye to perception of light only on the seventh day after the injury, and seven years afterwards had not improved beyond ability to count fingers at three feet.

Again, another point of interest is that pallor of the optic nerve was noted five months after the exposure, while seven years later there was definite atrophy which could not be traced to any other lesion. The author refers to the experiments by Usher and Dean[1] as bearing on this point. They wounded the retinæ of several animals, and found on subsequent microscopic examination an area of nerve degeneration always corresponding to the part of the retina which had been injured ; thus in a monkey's eye, wounded between the disc and yellow spot, the outer part of the nerve anteriorly was atrophic. Presuming that in Collins' patient the sun's rays had destroyed some of the retinal elements about the macula, the optic atrophy afterwards noted would correspond very closely to the results obtained by Usher and Dean in their investigations.

N. M. ML.

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[1] *Transactions Ophth. Society*, vol. xvi., p. 248.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

E. Nettleship, F.R.C.S., President, in the Chair.
Thursday, March 11, 1897.

Discussion on Retro-ocular Neuritis.—Mr. Marcus Gunn, in opening the discussion on Retro-ocular Neuritis, referred the disorder to a group of diseases which, though not recognisable by objective features, had distinct clinical manifestations, and on account of its subjective aspect was liable to be confounded with hysterical amblyopia, particularly when one eye only was affected. An important distinction between the two conditions was furnished by the reaction of the pupil, which was active in the hysterical condition, but sluggish or absent in the nerve affection, there being sometimes failure in maintaining the contraction. Occasionally the optic disc was affected, and in some cases both eyes were involved, but the changes in the disc were never gross. In papillitis the fundus changes preceded the loss of vision, but in retro-ocular neuritis vision failed early in the centre of the field, the disc changes occurring later. Vision improved with subsidence of the neuritis, which might be followed by some pallor of the outer half of the disc proportionate to the intensity of the inflammation. It appeared that the swelling in papillitis did not interfere immediately with the transmission of nerve impulses, whereas in deeper seated neuritis it did so immediately, owing to the pressure being exerted centripetally upon the nerve fibres. This he attributed to the resistance of the nerve sheath; he pointed out that the effect was most marked when the portion of nerve affected lay within the optic foramen, which was quite unyielding. One of the most prominent features of the disease was the presence of a central scotoma, first for colour (green-red) and afterwards for white, showing that the macular fibres were earliest affected. This might be due to the following facts : (1) The macular fibres, though

peripheral at the ocular end of the optic nerve, attain a central position in the optic foramen ; (2) the macular fibres, being functionally the most active, may be earliest affected by pressure ; (3) the principal lymph current traverses the centre of the nerve ; (4) the macular fibres occupy a relatively large area in the optic nerve. With regard to the symptoms of retro-ocular neuritis, in one there was subjective sensation of colour of a violet or reddish pink tint, with slight peripheral contraction of the field and a diminution there of perception for green, which assumed a bronze appearance. The movement of the eye-ball was painful in one or other direction corresponding with the portion of nerve affected. The degree of ambly-opia varied greatly. Acuity of vision was diminished in a bright light or after prolonged use, general fatigue, or exhaustion from want of food. In some cases objects appeared as if seen through a moving haze. These pheno-mena might be explained by the breaking up of the nerve-sheath, leaving the axis cylinders incompletely insulated, or by the alternating activity of exhausted fibres. In support of this last suggestion it has been found that the colours red and blue are distasteful to the subjects of retro-ocular neuritis. The liability to injury appears to be more marked at the periphery and extreme centre of the nerve. The causation of the neuritis may be traced locally to the spread of the change to the nerve from neigh-bouring orbital cellulitis, due to erysipelas, cold or septi-cæmia ; or to periostitis extending to the optic foramen from the adjacent sphenoidal sinuses, in which case both nerves are affected ; or the neuritis may be a local mani-festation of a general disease, such as syphilis, gout, or rheumatism, the latter having a tendency to recurrence; and, finally, the optic tracts and nerves are liable to suffer as part of the central nervous system as in insular sclerosis.

Dr. Buzzard spoke on the medical group of cases exhibiting the features of retro-ocular neuritis. In insular sclerosis disorders of vision were frequently associated with atrophy of the optic disc, a condition referable to neuritis

of the retro-ocular portion of the nerve ; 50 per cent. of cases of this disease presented pallor of one or both discs, or in place of this a red-grey injection and amblyopia lasting for days or months. *Post-mortem* there were found islets of gelatinous tissue of a warm grey colour, having a diameter of an inch or more in the brain, and varying greatly in number. Microscopically, they were found to exhibit naked axis cylinders, increase of the fibrous elements and a primary vascular change, but a certain proportion of the fibres were degenerated independently of the other changes. Dr. Buzzard attributed these appearances to interstitial inflammation occurring in local patches capable of resolu- tion, but causing temporary paralysis, and he assumed the same condition to be present in the optic nerve. Secondary degeneration did not take place, the lesions were localised, and the pallor of the disc was due to interference with blood-supply, not to atrophy. The local diagnostic features were the pallor or greyish-white colour of the disc, chiefly in the temporal half, the edges being sharp, the physiolog- ical cup deep, and the lamina cribrosa distinct ; these changes were bilateral and associated with preceding or immediate impairment of vision ; in the intra-ocular form of optic neuritis on the other hand the changes were much more obvious and attended at first with little or no altera- tion in vision and no central scotoma, the loss of vision being slowly progressive. In the retro-ocular form the central scotoma was general and the peripheral amblyopia a characteristic feature, but both were transitory, and there was no progressive deterioration of vision. Concentric contraction of the visual fields sometimes occurred in diphtheria, and the speaker referred to an instance in a man, aged 58 years, with paresis of arms, legs, and palate after sore throat, to whom the floor appeared concave at the point of sight. There was no scotoma, the fields of vision were small, and the left disc was pallid. The fields had since enlarged.

Dr. Gowers drew attention to the now established fact that an axis cylinder contained as many fibrils as there were fibres in a nerve, and the important bearing this had

on the comprehension of pathological changes. In connection with the rheumatic origin of neuritis he quoted an instance of a young man who, after a bath, suffered from paralysis of the ocular nerves with proptosis and tenderness of the left eye associated with convulsions, and followed by a similar condition on the right side. He attributed the symptoms to acute cellulitis of the orbit extending to the membranes of the brain. Referring to ten cases of insular sclerosis in which the optic nerve was affected there were none, he thought, in which the nature of the changes suggested an islet in the optic nerve. In many of the cases the state of the vision and appearance of the disc were identical with those occurring in tabes dorsalis, apparently a primary affection of the nerve fibres. The cases referred to by Dr. Buzzard he thought were of a similar nature. Retro-ocular neuritis was frequently a result of blood poison, especially gout. The symptoms might simulate those of an intra-cranial tumour affecting the chiasma.

Dr. Berry thought the disease was a very obscure one, and that the diagnosis was made too frequently with little precision. The condition was distinct from papillitis of cerebro-pathological origin. Pallor and atrophy of the disc he considered were doubtful signs of retro-ocular neuritis. Symptoms very similar to those attributed to this disease occurred in connection with irritation in the teeth and also in migraine where nothing could be found in the fundus. Toxin poisoning, he thought, was unlikely to produce changes in one eye only. He classified the forms of defective vision due to retro-ocular causes as (1) those connected with cerebral tumour; (2) those due to chill and for the most part unilateral; and (3) toxic amblyopia, which was bilateral and, he thought, not neuritis. Many cases diagnosed as hysteria were more serious cases of nerve or cerebral disease which manifested itself later.

Dr. Hill Griffith said that, excluding tobacco amblyopia, he had seen twenty-seven cases of the kind under discussion, eight of which had been bilateral. The cases

occurred between the ages of 14 and 57 years. There was a central scotoma in nearly all, and no contraction of the field of vision. A direct light reflex was present, though in three cases there was no perception of light. The vision and pupil reflex were ultimately restored in every instance. Pain occurred early only, and was at its worst about the second day. The disc at this period was pale or unaltered. All the cases were treated with potassium iodide, salicylate of soda, and blisters, and recovery took place in all, though in some vision was not as good as before the attack. Dr. Griffith agreed with the suggestion that the symptoms were probably due to rheumatic axial neuritis.

Mr. Richardson Cross, referring to the literature of the subject, said that central scotoma and slight pallor of the optic disc appeared to be the most widely observed features. Out of fifty-seven cases of retro-ocular neuritis from 154 instances of optic nerve disease the disorder was attributed to toxic causes in two-thirds ; this was a higher percentage than in his own observations. Uhtoff in 400 alcholic subjects observed pallor of the disc in seventy ; half he attributed to alcohol and one-sixth to tobacco, the choice of these among the remaining third being uncertain. He considered alcohol to be an important factor in the causation of the condition, though it was asserted by some that the occurrence of tobacco amblyopia was hindered by its use. In his own five cases there was slight papillitis in one eye with a central scotoma, but no affection of the periphery and no other ocular changes.

Mr. Little, speaking of these cases apart from toxic causes, dwelt upon the occurrence of pain, central scotoma, and diminution of visual acuity as characteristic of the affection in the absence of definite fundus change. Though the scotoma was large and in one case there was absolute blindness, all the cases recovered rapidly.

The discussion was adjourned till Wednesday, March 24.

Adjourned Meeting, *Wednesday*, *March* 24, 1897.

Mr. W. H. Jessop referred to cases illustrating the origin of retro-ocular neuritis in tooth irritation and in fractures

of the orbit, where atrophy of the nerve followed in about a month. The forms of neuritis associated with disseminated sclerosis and locomotor ataxy differed from the foregoing in the peculiar bluish-white appearance of the papilla, but were indistinguishable in aspect from one another. Though the visual fields and appearance of the nerve remained un-altered in the latter, in about four years there was usually complete loss of light perception. Hysterical and diph-theritic cases recovered completely.

Mr. Quarry Silcock, referring to the frequency with which the axial fibres of the optic nerve were affected, added another possible explanation to the suggestions already made by Mr. Marcus Gunn. This was that near the optic foramen the axial fibres were furthest removed from the vasa vasorum, so that any interference with the blood current might be expected to affect this tract first. He demurred to the greater functional activity of the fibres or of the lymph-flow in this region predis-posing to degeneration under the influence of pressure. He referred to cases of irregular diabetes in which the defect of vision was more marked than the colour scotoma, where the symptoms were referred by Sir W. Broadbent to high arterial tension, and in which with lowered blood pressure the scotoma disappeared and the vision became normal. Subsequently indiscretion in diet led to the re-appearance of glycosuria, and it was a question whether the ocular symptoms were due to the direct action of a poison or of altered blood pressure on the nerve. Alcohol led to arterial sclerosis, and this to exudation from the vessels, producing transient œdema, which might account for the transitory character of the manifestations in the eye. He thought that, except in direct orbital inflamma-tion and injury, the cause of the disease must be sought in general diseases like syphilis, gout, and rheumatism, and this would accord with the benefit derived from salicylate of soda and blisters in the cases alluded to by Dr. Hill Griffith.

Mr. Holmes Spicer spoke of cases which did not improve, but in which the scotoma remained. They

occurred in males beyond middle life, who were the sub-
jects of sudden failure of vision, unaccompanied by pain
and independent of assignable cause.   There was some
swelling in the disc, which was best observed by the
parallactic movement and apparent constriction of vessels.
The use of tobacco had been quite moderate in these
cases.   Usually, failing to improve, they ceased to attend
until the other eye began to fail.   There were commonly
general symptoms, such as paralysis or mental hebetude,
which came on later, indicating progressive degeneration
of the nervous system.

Dr. Risien Russell described the changes he had met
with in the nervous system in a fatal case of disseminated
sclerosis ; the changes were identical in their naked eye
and microscopic appearances in all parts, including the
optic nerve and tract, though it was not possible to say
whether they originated in the nerve elements or the
interstitial tissue.   The changes in the optic nerve were
advanced, both nerves being completely destroyed in front
of the chiasma, and there were extensive areas of degenera-
tion in the optic tracts, but strangely enough there were
districts of undestroyed fibres between.   Optic nerve
changes were more common, he thought, in disseminated
sclerosis than Dr. Gowers seemed to allow, but the visual
defect was often transitory at first, whereas in tabes it was
permanent.   The patient in question had come under
notice twenty-five years before with paralysis of both legs,
when there occurred sudden complete blindness with in-
ability to move the head, recovery occurring in two days
from all the symptoms except the loss of vision in the right
eye, which was permanent.   On admission to the hospital
there were symptoms indicating postero-lateral sclerosis.
In the right eye there was bare perception of light with
faint reaction of the pupil.   The vessels appeared to be
normal, but there was atrophy of the disc.   He died from
what appeared to be a sudden myelitis of the upper part
of the cord, though there was no evidence of this at the
necropsy.   There was postero-lateral sclerosis, and in the
cranium the dura mater was adherent behind the foramen

opticum, binding down the nerve, which was consequently torn in removing the brain. This right optic nerve was destroyed and flattened from the eyeball to the chiasma.

Dr. Macnaughton Jones said that these cases might be regarded either from a clinical or pathological standpoint. The cases he had met with were characterised by aberrations in the colour field with variable changes in the disc, these being sometimes absent, the symptoms being limited to one eye. Complications were rare and recovery was general. He attributed the condition to poisons such as alcohol, tobacco, syphilis, gout, or to grief, mental worry, or eye strain, but he had not encountered it after febrile diseases. Cases dependent on functional changes were probably temporary, and those due to organic lesions permanent.

Mr. Adams Frost quoted thirteen cases of acute retroocular neuritis in which the loss of vision occurred in from one to three days, and amounted in no less than five to loss of perception of light. Three only were bilateral. There was hyperæmia of the disc, and in some papillitis two days later. The prognosis was good, all the cases recovering, seven of them completely.

Mr. Doyne, after eliminating instances which might be due to tobacco and other assignable causes, had had eighteen cases, which he divided into binocular and monocular varieties. Of these, the former included eleven patients in whom there was but slight sign of inflammation in the fundus, and of whom only two fully recovered. Of the seven monocular instances five were in women and all recovered.

The President said the term retro-ocular neuritis no doubt covered many clinical conditions, and it was evident that in the present discussion cases of widely different nature had been described. He selected 120 cases which he divided according to their clinical aspect into several groups. (1) Monocular and idiopathic included the smaller number, which all recovered ; (2) cases ranging in age from 16 to 40 years, probably syphilitic, of which thirty-eight were females and sixteen males, all of whom re-

8

covered, and exhibited no general nervous symptoms
(the symptoms in some of these cases were probably due
to gummata of the nerve) ; (3) nineteen cases, including
eight men and eleven women, thirteen of whom were aged
over 40 years, who did not recover, and in whom the pain
at the onset was more intense and lasted more than four
days ; (4) five cases, three men and two women, in whom
vision failed in both eyes at short intervals, one attack
overlapping the other, followed by slight pallor of the
disc and complete recovery, the ages ranging from 23 to
35 years ; (5) cases of disease of the general nervous
system, chiefly disseminated sclerosis and locomotor ataxy,
in which both eyes failed at longer intervals, the disc
ultimately becoming sclerosed.   Other cases were probably
connected with disease of the teeth or of the sphenoidal
sinus.

Mr. Gunn and Dr. Buzzard replied and the discussion
closed.

COLLEGE OF PHYSICIANS OF PHILADELPHIA,

OPHTHALMOLOGICAL SECTION.

Wm. F. Norris, M.D., in the Chair.
Tuesday, February 16, 1897.

Dr. de Schweinitz described a case in which *A Piece of
Steel embedded in the Ciliary Body was located by means of the
Roentgen Rays.*—Extraction with the electro-magnet was
performed after two similar operative procedures, without
the use of the rays, had been unsuccessful.   In spite of
the repeated traumatisms the patient recovered with good
vision.   The foreign body had remained in the ciliary
body for twelve days and had caused cyclitis.   Dr. Max
J. Stern, of the Philadelphia Polyclinic, furnished the

radiograph ; it clearly indicated the position of the foreign body which had been unrecognisable by ophthalmoscopic examination owing to the hazy condition of the media.

Dr. W. F. Norris said that he had recently treated a case where, by passing the rays through the bones of the head, the presence of two No. 6 birdshot in the orbit and one in the pharynx in the same patient had been demonstrated. The Crookes' tube was held on one side of the head and the plate fastened on the opposite temple.

Dr. S. D. Risley reported a *Case of Detachment of the Retina and Choroid*.—The patient, a man aged 29, was suffering from violent left hemicrania which originated in the left eyeball. Right eye healthy ; left totally blind. The loss of sight occurred immediately after violent concussion caused by the discharge of a gun a few inches from the left side of his head. There was no pain at any time. The ophthalmoscopic appearances indicated detachment both of retina and choroid, and Dr. Risley thought that this was probably the result of the explosion.

Dr. G. C. Harlan completed the history of a patient, whom he had previously shown, to illustrate a *New Method of dealing with Cicatricial Contraction of the Orbital Tissue after Enucleation*. There was a number of cicatricial bands extending from the lids to the bottom of the conjunctival sac which obliterated the sulcus and made it absolutely impossible to wear even the smallest artificial eye. An attempt was made to form an artificial sulcus by passing a thick lead wire round the bottom of the cavity through the contracting bands and allowing it to remain in position until the walls of the sinus it had formed had completely cicatrized or '' skinned over.'' The patient was wearing the wire when he was shown to the Society, and he continued to do so without inconvenience for six or eight weeks, when it was removed by incising the tissue in front of it, and a leaden shell was inserted whose edges rested in the groove where the wire had been. Later an artificial eye was substituted for the leaden shell, and has been worn since without inconvenience. Dr. Harlan has two other patients under similar treatment, one of whom was exhibited at this meeting with the wire in place.

Dr. P. N. K. Schwenk proposed, in order to avert the œdema that so often follows the use of leaden plates and artificial eyes, that holes should be bored near their edges. By this means he has prevented the formation of a vacuum behind them, caused probably by the absorption of air that had been introduced at the time of insertion of the artificial eye.

Dr. Schwenk exhibited, by invitation, a *New Artificial Eye* that has the advantages over those now in use in that the edges are thick and rounded, and the body is much heavier, so that it will not fracture even if exposed to considerable violence.

Dr. A. G. Thomson exhibited, by invitation, a *Case of Foreign Body in the Lens.* A weaver, aged 25, came to him in January, 1897, complaining of asthenopia only. The right eye had been convergent and amblyopic since childhood. With a cylindrical correction, vision of L.—the wounded eye—was $\frac{5}{5}$, and by its use his symptoms disappeared. Tenotomy of the interni cured the squint. In February he returned complaining of diminished vision in the L. By oblique illumination a bright reflecting foreign body was easily seen in the posterior half of the lens. It was then discovered that in December, while using a hatchet to break up a wooden box, the patient had the sensation of a foreign body impinging on the cornea, and imagined that he had been struck by a piece of wood. This he thought had been removed by his doctor. Vision had now decreased to $\frac{5}{30}$. A small linear scar on the lower outer sector of the cornea, a similar scar on the lens capsule, and the quiescent foreign body lying in the lens substance could be seen.

The features of especial interest in this case were the freedom from all irritation and the preservation of vision for two months after the entrance of the foreign body.

Dr. Edward Jackson had searched for the path of the foreign body, and had been unable to see the slightest trace of it. Opacity had developed first immediately adjacent to the anterior and posterior capsule, and even now had not penetrated into the nuclear region. He had

seen cases in which opacity had formed soon after the entrance of a foreign body, and then had disappeared to reappear three or four months later.

Dr. Harlan considered the best treatment in the case of this patient to be the extraction of the foreign body by means of the magnet while the lens was clear, and the extraction of the lens later. A case of his own had justified these measures.

Dr. B. A. Randall suggested that the so-called foreign body might be a deposit of pigment. He had seen in a number of children opacities that closely resembled foreign bodies even to the metallic shine, but without any history of traumatism. The deposits were in the posterior part of the lens and occasioned no trouble.

Dr. Wm. Thomson proposed to submit the patient to the X-rays, in order to determine whether the foreign body was a piece of metal or a piece of wood. If the former, a powerful magnet could be employed to draw it forward so that it could be more readily extracted. In its present position extraction would be extremely difficult. He suggested, first, discission and removal of the anterior portion of the lens, then the introduction of the magnet, or Pagenstecher's operation for the removal of the lens in its capsule; or, better still, the extraction of the lens with the foreign body by the usual method for senile cataract.

Dr. Risley thought the Haab magnet dangerous. There is liability of the body to fall into the posterior chamber, as had twice happened to him. The safest procedure would be the Pagenstecher operation after a large preliminary iridectomy.

Dr. de Schweinitz suggested the use of the Haab magnet or the method advocated by Dr. Harlan. With reference to the amblyopia, he observed that " neglected " eyes can be divided into two classes : those that have defects in the field for form and colour, especially scotomata with changes in the nerve and retina, and those that are amblyopic without anatomical changes. In the former no improvement of vision can be expected, while the vision of the latter may be improved by enforced use.

9

Dr. Edward Jackson showed a *Modification of the Bino-cular Magnifying Lenses* for use when operating upon the eyeball. The lenses were supported by a metal head-band such as is used for the head-mirror, but with two arms, giving a more fixed position and preventing lateral tilting. This arrangement gives a distance of three inches between the lenses and the seat of operation, and six inches or more between the eye operated upon and the eyes of the operator. He had employed it for the removal of foreign bodies from the cornea, curetting corneal ulcer, division of congenital and secondary cataracts, cataract extraction, iridectomies, &c., and in operations of this kind thought it would prove most valuable. In beginning to use it there is need of some care not to under-estimate the length of the incision or the amount of tissue removed.

A CASE OF
CONGENITAL DOUBLE ABDUCENS, AND RIGHT-SIDED FACIAL PARALYSIS.

By W. B. Warrington, M.D.Lond., M.R.C.P.

The following case was under the care of Mr. Shears, of the Liverpool Eye and Ear Infirmary, to whom I am indebted for permission to record it.

The patient, C. R., aged 16, is the eldest of three healthy children. The birth of the child was very prolonged, but instruments were not used. The general health has always been good, and nothing is known about any diseases in infancy.

When three months old the parents noted that the child could not move her eyes outwards, and that there was a "crookedness of the mouth."

At birth the child had a supernumerary little finger on each hand, and a rudimentary additional left auricle.

Family History.—Health of the parents good; none of the other children similarly affected; no evidence to suggest specific disease.

Present Condition.—Patient a well built girl in excellent general health, but some mental obtuseness.

State of the Eyes.—There is complete inability to move either eye outwards beyond the median line, with slight convergent strabismus. The associated movements of the internal recti, on attempting to look sideways, are not fully completed. Convergence can be naturally performed. Movement upwards and downwards is complete in extent, and takes place in the vertical plane. No ptosis.

10

Pupils react equally to light and accommodation, and are of the same size.

Retinal vessels somewhat tortuous; otherwise the fundus is natural. Slight astigmatism present.

V.: R. $= \frac{6}{9}$; L. $= \frac{6}{6}$; Jäger 1 with both eyes at ten inches. Field of vision natural. Binocular vision at ten inches, but not at ten feet.

Facial Muscles.—Slight but distinct weakness on the right side, of the muscles drawing the angle of the mouth upwards and outwards. Complete loss of power in the frontalis and corrugator supercilii of that side, with loss of faradic excitability; but with this exception the other facial muscles respond equally with the left side to the electrical current, and have their natural strength.

Hearing. — There is complete absence of air conduction on the right side, and it was found impossible to pass a Eustachian catheter, suggesting a mal-development of that canal. Bone conduction present, but less than on the opposite side.

The function of other cranial nerves appears normally performed, and no further affection of the nervous system noted.

A considerable number of cases of congenital defects of the ocular movements are recorded, but very few similar to the above.

Möbius[1] has collected the cases of congenital defects recorded up to 1892, and his list includes five cases of double abducens, and facial paralysis, and four cases in which both sixth nerves, but not the facial, were affected.

Under the former class are those described by—

Möbius.[2]— Complete paralysis of outward movement, and of the associated movement of the internal recti, with normal power of convergence, and almost complete paralysis of all the facial muscles, with loss of electrical reaction.

[1] *Münchener Medicinische Wochenschrift*, 1888 and 1892.
[2] *Münchener Medicinische Wochenschrift*, 1888.

Gräfe.[1]—Similar to above.

Chisolm,[2] which differed in having marked convergent strabismus, which was also present in Harlan's[3] case.

Schapringer.[4]—Similar to that of Möbius and Gräfe, but the patient had also a bifid uvula and a twisted index-finger.

A.—Under the latter class, without facial paralysis. Harlan,[5] Mackinlay,[6] Möbius[7] and Lamhofer-Möbius.[8]

Later references to similar cases are—

Froger.[9]—Cas d'optalmoplégie externe bilatérale congénitale et de paralysie facial bilatérale congénitale.

Vossius.[10]—Almost complete inability to move either eye.

Gazépy.[11]—A brother and sister similarly affected, and another brother and sister who, though healthy, had children suffering from the same condition.

Pathology.—In no case yet has an examination been made of the central nervous system, though the symptoms of many of the above cases point strongly to a lesion involving the sixth and seventh nuclei. Changes in the structure of the muscles and nerves of the orbit have been found in some cases (see Möbius, *loc. cit.,* and Lawford[12]), but this cannot be regarded as the essential lesion. The paralysis of the facial muscles in the above case is interesting in its unilateral character, and because of the escape of the orbicularis palpebrarum and lower facial muscles.

[1] Gräfe, *Gräfe-Saemisch's Handbuch der Augenheilkunde,* vi., p. 60.

[2] Chisolm, *Archiv. f. Augenheilkunde,* xvii., 4, p. 414, 1887.

[3] Harlan, *Trans. American Ophth. Soc.,* 1881, p. 216.

[4] Schapringer, *Med. Mon. Schrift.,* i., 12, p. 622, 1889.

[5] Harlan, *Trans. American. Ophth. Soc.,* 1885, p. 48.

[6] Macinlay, *Trans. of Ophth. Soc., United Kingdom,* vii., p. 298.

[7] Möbius, *Munch. Med. Wochenschrift,* 1892.

[8] Lamhofer-Möbius, *Ibid.*

[9] Froger, *Ann. d'Oculistique,* t. cviii., p. 311.

[10] Vossius, *Revue des Journaux d'Ophtalmologie,* 108, p. 145.

[11] Gazépy, *Archiv. d Oph.,* xiv., Mai, p. 77.

[12] Lawford, *Trans. Ophth. Soc.,* vol. viii., p. 282, 1888.

A CASE OF LOSS OF CONJUGATE MOVEMENT OF THE EYES TO EITHER SIDE; ALMOST COMPLETE RECOVERY.

By A. H. Thompson, M.A., M.B.

Clinical Assistant, Moorfields Eye Hospital.

W. F., aged 55, smith's stoker in railway works, attended Mr. Lawford's clinique on July 14, 1894. The condition at that time was as follows :—

On looking at a distant object the eyes are parallel, or very slightly convergent. On trying to look either to the right or the left, neither eye moves outward beyond the middle line, while its fellow moves inwards only very slightly. *Convergence is retained unimpaired*. Upward and downward movements unimpaired. No ptosis. Pupil reaction normal. Patient says that he noticed the peculiar condition of the eyes just three weeks ago, and that it came on suddenly. He has had no pain—only slight giddiness, and has seen things double only for a day or two during the last week.

Ophthalmoscopic signs *nil*. In each eye H. + 2·50 D. V. with correction ⅚ and J. 1 in each. Knee-jerks very glib, and ankle-clonus present on both sides. Movements of palate, tongue, *and facial muscles* normal. No loss of co-ordination on standing with his eyes shut. Urine, sp. gr. 1013. No albumen or sugar. Patient says he has always been a healthy man, except for lumbago sometimes. No specific or consumptive history. Treatment, pot. iod. gr. v. t.d.s., increased to gr. x. on July 18.

July 25.—No change.

August 1.—There is now perfect movement inwards of each eye, but neither external rectus can move the eye outwards beyond the mid-line. Patient complains of weakness and loss of appetite.

August 15.—No change. Patient complains more of weakness. Pot. iod. gr. xv.

August 29.—Some jerky movement of the right eye outward beyond the mid-line.

September 12.—Both eyes can move outwards imperfectly. Inward movements perfect. When the eyes are at rest there is still slight convergence. Diplopia noticed in the morning ; not later in the day.

October 3.—Movements almost perfect in all directions, except that he cannot maintain the extreme lateral position of the eyes for many seconds together. V. with correction $\frac{6}{6}$ in each. Occasional diplopia.

October 31.—He " cannot " see double. Lateral movements full. In convergence for near objects there is apparent over-action of the internal recti, so that when one eye is covered it becomes more convergent. No ophthalmoscopic changes. Pot. iod. omitted.

March 23, 1895. — Occasional diplopia, but it is not troublesome. Lateral rotation of right apparently full. To the left there is perhaps a slight defect, and he cannot maintain complete deviation to the left. Both eyes, but especially the left, tend to roll towards the mid-line after a few seconds.

December 20, 1895.—Left external rectus still does not act well.

The final note is at the beginning of this year.

January 9, 1897.—Occasional diplopia still. On looking to the left some nystagmus, and after a few seconds the left eye rolls back towards the mid-line. On testing with coloured glasses, homonymous diplopia is elicited. Health perfect, he says. Knee-jerks still exaggerated.

Summarising the above, a healthy man, with nothing abnormal except increased reflexes, suddenly finds that the power of moving his eyes laterally is gone, while he can still converge for near objects. In five weeks both internal recti had recovered. In nine weeks the right external rectus had begun to recover. In eleven weeks both external recti had partially recovered, and in fourteen weeks the recovery was nearly complete. The permanent condition which remains is slight weakness of the left external rectus. With regard to the location of the lesion in this

case, it seems to be established that whereas the conjugate deviation which is so often associated with hemiplegia is, as a rule, only temporary, a condition of permanent conjugate deviation may result from lesions of the pons involving either the sixth nucleus of one side or an area in its immediate neighbourhood (*cf.* Gowers, ii., 175) ; also Bennett and Savill in *Brain* for July, 1889). Further, it is established that in cases of conjugate paralysis the power of convergence need not be affected at all, this being true whether the lesion is in the pons or higher up. For instances, *v.* Bleuler in *Deutsch. Archiv. f. Klin. med.*, 1885, bd. 37 ; also Priestley Smith in *Ophthalmic Hospital Reports*, vol. ix.). The evidence with regard to *bilateral* loss of conjugate movements is much more difficult to find. Of course in complete ophthalmoplegia externa the lateral eye-movements, like all others, are abolished, and in incomplete cases the external and internal recti may be the muscles chiefly affected. This was so in a case of Dr. Beevor's published in the *Ophthalmol. Society's Transactions* for 1887, but here the power of convergence was lost as well as that of lateral movement. Again, in disseminated sclerosis somewhat analogous symptoms have been met with, *e.g.*, in a case of Uhthoff's, published in the *Archiv f. Psychiatrie* for 1890, p. 384, where in conjugate movements the internal recti were paralysed, while they continued to act in convergence well.

Again, in 1892, a case was published of *congenital* loss of the power to look to either side with retention of convergence, the facial on both sides being paralysed as well. (Fryer, *An. of Ophth. and Otol.*, Kansas City, 1892, summarised by Nagel.) In all these cases, judging by the analogy with unilateral cases, the lesion was probably at or near the sixth nuclei ; and there was no tendency to recovery. On the other hand, I have found records of the following three bilateral

cases in which, with or without associated symptoms of cerebral lesion, more or less complete recovery took place after a few weeks or months, and it is to this group of cases, I think, that the one here published belongs.

WERNICKE (*Deutsch. Med. Wochensch.*, Feb. 21 and Feb. 28, 1880). The patient was a young lady, aged 19. Symptoms began in June, 1879, with diplopia and right internal squint, accompanied by vomiting, headache, fever, giddiness, noises in the ears and retention of urine. Within six weeks after the affection of the right external rectus was first noticed, the paralysis extended successively to the left internal rectus, the left external rectus and the right internal rectus. Meantime, double optic neuritis and hemiplegic symptoms on the right side developed. In less than six months, under a course of pot. iod., all the eye movements were recovered in the inverse order in which they had been lost, and nothing but slight hemiplegic symptoms remained.

BLEULER (*Deutsch. Archiv. f. Klin. Med.*, 1885, p. 533) A healthy man, aged 39, in the course of four weeks developed the following symptoms :—Singing in the ears, formication from finger tips to shoulders, first on the left side, then on the right, giddiness, uncertain gait, headache, failing sight, weakness of the extremities, especially the left, retention of urine, polyuria, difficulty of swallowing, slight central paresis of left lower facial muscles, and paralysis of eye muscles, as follows :—

August 29.—" Lateral movements nearly absent. On being told to fix, the eyes remain nearly motionless in the mid line. The left eye moves slightly. Up and down movements free except for slight nystagmus."

September 11.—Both eyes powerless to look to left beyond the mid line. The left eye can look to the right about 2 mm., the right still less. The interni act equally but slightly. Accommodation not affected.

October 4.—Movements normal.

In these two cases convergence was affected along

with conjugate movements. The next case resembles my own far more closely in that convergence was retained, and also in the almost complete absence of associated symptoms.

3. MILLIKIN (*Trans. Amer. Ophth. Society*, 1890, p. 644). *March* 21, 1890.—Man of 33, subject to attacks of diplopia for thirteen years. Alcoholic, but no specific history. Good V. in each eye. Severe headache at times. In winking, the left eye does not close nearly so fully or quickly as the right, but by forcible use of the orbicularis it can be closed. Up and down movements free. *Lateral movements completely absent. Convergence good.* Pupils normal. Fundi normal. Knee-jerks fairly marked, equal. No ankle clonus. Ordered pot. iod. gr. x. t.d.s. A week later the right eye had good movement outwards and slight movement inwards. A week later still the lateral movements of the right were apparently normal. The left had perceptible movement outwards and little movement inwards, though in neither direction were they so good as the right. After this the patient was lost sight of.

Now the question arises with regard to these four cases (including my own), whether the lesion was at the level of the sixth nuclei or above it. The temporary nature of the affection, if we may argue from the temporary nature of the conjugate deviation in cortical lesions, points to the lesion being above the nuclei. Moreover, the affection of the facial in the three cases last mentioned was of distinctly cerebral type. In my case there was no affection of the facial at all, and there could hardly be a lesion on both sides of the pons at the level of the sixth nuclei which could leave the fibres of both facial nerves intact. On the other hand, it is very unlikely that there should be two symmetrical, non-degenerative lesions, either at the level of the nuclei or in the cortex of the brain. A far less improbable explanation of this, and I think also of the other three cases, seems to me to be a

single lesion occurring at the point where the fibres from the right cerebral hemisphere, which produce conjugate movement to the left, decussate with the fibres from the left cerebral hemisphere, which produce conjugate movement to the right, on their way to the nuclei or centres in the pons. According to Gowers this decussation takes place somewhere in the region of the corpora quadrigemina. The nature of the lesion in this case must be a matter of mere conjecture. The influence of the specific drug may have been an element in the cure, but it is worthy of note that in Millikin's case, where also pot. iod. was prescribed, and where improvement was even more rapid than in this, it turned out on inquiry that after taking two doses of his medicine, the patient had spilled the rest.

In conclusion I must thank Mr. Lawford for allowing me to make use of the notes of his case.

CASE OF OPTIC NEURITIS AFTER PERFORATING WOUND OF THE EYEBALL.

By Cecil E. Shaw, M.A., M.D.

Assistant Surgeon to the Belfast Ophthalmic Hospital, &c.

A. M., aged 8, was brought to me on August 23, 1895, with the following history :—On July 29 the right eye had been wounded at the lower and inner margin of the cornea by his falling on a sharp stick in a hedge. He had been taken to a medical man, who, I was told, had excised a piece of iris which had

prolapsed. The wound was healed, and only slight ciliary injection was to be seen near the cicatrix. The pupil was well dilated with atropine and the iris clean. Tension was normal, and vision apparently equal to counting fingers at six or eight feet, but, owing to the youth and timidity of the patient, an exact measurement was impossible. The vitreous was clear, except for a few streaks of opacity, looking like cobwebs, running into it from the site of the wound. On examining the disc I found a distinct but not intense optic neuritis, the edges of the disc being invisible and the vessels dilated. There was no pain or tenderness in the eye. The left eye was in all respects quite healthy.

I told the parents that though enucleation would no doubt be the safest course, I should not urge it if they chose to risk the possible consequences of retaining the eye for the present and watching the course of events. Dr. Brice Smyth agreeing they decided to wait for the present. The patient was seen three times a week, and remained the same for some days.

On September 4, twelve days after I first saw him, the neuritis was the same, or possibly a little less intense, but tension was decidedly less, and vision also less, so I suggested a second opinion, and accordingly the parents took the child to Mr. Swanzy, in Dublin. He found a detachment of the retina below, and said that, though the eye might retain its shape and appearance, he thought it was more likely to shrink, and that though he saw no present necessity for operative interference, enucleation might become desirable for the purpose of fitting a glass eye.

After this the eye got rapidly softer, and on September 26 it was perceptibly shrunken, the anterior chamber was gone, there was no perception of light, and details in the fundus could not be distinguished. On September 28 I enucleated the eye, and placed it

in formalin to harden. The patient improved rapidly in general health, and in a few months an artificial eye was fitted. The left eye remained perfectly healthy. Unfortunately the hardened eye, which I had taken to the Pathological Laboratory at Queen's College, was by a mistake cut open in my absence, and without freezing, so that the relative positions of the parts were somewhat disturbed. I embedded it in celloidin, and cut sections in the usual manner. Some of these were stained by Gaw's method and carefully examined for micro-organisms, with a negative result. Others were stained in hæmatoxylin and eosin, and show very well the optic neuritis. The retina is completely detached, but it is impossible to say whether this took place entirely before enucleation or partially afterwards, when the eye was divided. The increase of connective tissue at the disc is well seen, and the pushing away from the edge of the disc of the external layers of the retina.

In the accompanying photograph, kindly done for me by Mr. J. J. Andrew, L.D.S., these features are readily seen.

I have not been able to find any record of a case of optic neuritis after perforating wound, though I have been told that one exists.

SABRAZÈS and CABANNES (Bordeaux). A Contribution to the Study of Nuclear Ophthalmoplegia; Glioma of the Pons. *Archives d'Ophtal.*, *March*, 1897.

The patient was a servant girl, 25 years old.

Previous History. — Measles and influenza when 18. Frequent epistaxis since the age of 15. When she was 20 she had a fall, resulting in a fracture of the leg, and her symptoms date from then (*i.e.*, five years back).

Present State. — Occipital headache, especially in the morning; giddiness and staggering gait; spasm of the left half of the face; ophthalmoplegia externa of both eyes, affecting the internal and external recti; choked disc; facial hyperæsthesia on the left side (skin, mucosa, and conjunctiva).

The staggering gait is exaggerated when the eyes are shut. Sensation normal. Weakness of arms. Hyperæsthesia of the left arm.

On October 12, 1896, she suddenly became comatose, and died in a state of hyperpyrexia.

Post-mortem, October 13.—Tumour of the pons and bulb; more marked in left half of pons.

Histology, Glioma.—The tumour involves the nuclei of origin and the trunk of the facial, abducent and pathetic nerves.

The hinder part of the oculomotor centres is altered secondarily (through circulatory disturbances). Integrity of the anterior nuclei.

Further Points.—As compared with the left the right optic disc shows only a slight degree of œdema and engorgement of the veins. Vision was very greatly impaired. Lateral movements of the eyes are impossible; vertical movements are accompanied by vertical nystagmus. The pupillary reflexes are present. Hearing on the left side is impaired. The plantar reflexes are abolished, the knee jerks much exaggerated. There is no apparent muscular atrophy.

Antisyphilitic treatment was followed by no improvement. Vomiting has not been present.

When coma came on the temperature went up and reached 40·2 C., and death speedily followed.

Post-mortem. — There was found cerebral engorgement but no hæmorrhage. The pons is much enlarged, especially its left half; the upper part of the bulb is also enlarged and irregular. The cerebellum, bulb and pons at their points of juncture are mingled in one mass. The meninges are not thickened or adherent. The abducent, trigeminal, facial, and auditory nerves are grayish, soft and friable. The other bulbous nerves are also more or less involved at their origin by the neoplasm. The optic nerves do not seem altered. The middle cerebellar peduncle (left) is thicker and harder than the right. The upper part of the pons is occupied by the tumour, which is grayish-red and soft in character; below it the substance of the pons is white, hard and resisting; 3·5 cm. in front of the posterior angle of the fourth ventricle the aqueduct of Sylvius is completely effaced.

The middle and lateral ventricles are much dilated and filled with clear cerebro-spinal fluid. The spinal cord appears healthy. Histologically the tumour is a pure glioma. The cells of the fourth nucleus are for the most part globular; many of the cells of the third nucleus are also altered in shape. These changes are due to circulatory troubles, the result of the neighbourhood of the tumour. The left optic nerve shows no trace of neuritis; in the intracranial portion there is a slight peripheral sclerosis. The sheaths and interfascicular spaces are very distended. All the vessels are permeable, but the lymphatic sheaths around them are dilated, and here and there are granular corpuscles.

The vagi present numerous fibres of Remak and some fibres in which the myelin is broken up. The left facial nerve, in a piece from the parotid region, shows numerous empty sheaths, myelin broken up, and some fibres clearly degenerate.

The authors lay stress on the fact of the knee-jerks

being exaggerated, while the plantar and abdominal
reflexes were abolished. They think that the exaggerated
knee-jerks point to a lesion of the peduncles or lobes of
the cerebellum, and quote another case in support of this
view.

<div align="right">W. WATSON GRIFFIN.</div>

NUEL (Liège). Sympathetic Amblyopia. *Archives
d'Ophtalmologie, March*, 1897.

Every one admits the existence of sympathetic irido-
cyclitis,—the most frequent manifestation of sympathetic
trouble—and of an optic neuritis or papillo-retinitis of
similar origin, but all are not agreed as to the existence
of a sympathetic amblyopia; indeed, most authors seem
to look upon it as a somewhat doubtful entity like sym-
pathetic cataract and keratitis. Some have described such
cases as of atrophy of the optic nerve, of anæsthesia and
hyperæsthesia of the retina, of retrobulbar neuritis; Nuel
prefers the term sympathetic amblyopia.

The first cases were described by Mooren in 1869 and
1873, when he published three typical examples in which
there was amblyopia with concentric restriction of the
field without any ophthalmoscopic signs. Since that time
several observers have recorded examples, down to Rosen-
meyer, who in 1894 described a case of simple sympathetic
atrophy. Nuel considers that several authors have wrongly
assumed the pre-existence of a neuritis, under the impres-
sion that the atrophy observed must have been preceded
by an inflammatory stage. Mauthner, Deutschmann,
Schirmer and Panas all cast some doubt upon the existence
of such a condition as sympathetic amblyopia, and most
surgeons seem to consider that the occurrence of the injury

was a mere accident, in a patient who was about to suffer
from atrophy at any rate. Nuel has, however, seen no
less than sixteen cases in the last four years; a number
which, if he is correct, is sufficient to put an end to doubts.
This malady is one which it is of importance to recognise
from a therapeutic and from a medico-legal point of view,
as will readily be conceded. These sixteen cases have
occurred among 10,000 patients, but Nuel warns us
against supposing the disease to be so common as that
would seem to imply, since the cases are very chronic and
the patients often wander from one clinique to another.

The author here gives very brief notes of each of his
cases, which it is not necessary to insert here. One must
mention, however, that in five of these cases symptoms did
not appear until subsequent to the removal of the injured
eye, which was performed before any sympathetic symp-
toms had manifested themselves. In one case the exciting
eye had not been perforated either by wound or operation,
but the symptoms and progress were just as in other
instances.

That the disease is truly sympathetic, that is, that it
arises as the distinct result of an injury to the other eye,
Nuel entertains no doubt ; the statement that one could
find no other cause for the occurrence might pass muster
in one or two cases, but hardly in sixteen.

While sympathetic irido-cyclitis manifests itself as a
rule in from one to two months after receipt of the injury
to the exciting eye, sympathetic amblyopia is generally
much more delayed. In his cases the author found that
it did not arise until after six months, sometimes not for
one to two years. It must be said that the beginning of
amblyopia is not easy to fix with exactness, since it
develops very gradually and with intermissions. Brecht
has seen symptoms arise within two months.

The first stage, which may be of long duration, is
characterised by an amblyopia without ophthalmoscopic
signs; the patient complains of transitory obscurations of
sight, principally when he endeavours to make free use of
the eye. Even a careful clinical examination may reveal

nothing at this stage; visual acuity, colour vision, and
fields appear normal; and the surgeon is very apt, taking
the patient's circumstances of recent injury, &c., into too
hasty consideration, to regard the patient as simulating.
But similar symptoms return month by month, the patient
returning or going from hospital to hospital. He can no
longer work on account of these transitory obscurations;
he often complains of a dull heaviness in the head, of vague
pains in forehead and temples, though pressure upon the
injured eye gives rise to no particular uneasiness. Some-
times there is a moderate degree of photophobia. Gradually
too there comes on a slight amount of deterioration of
sight, vision goes down to $\frac{5}{6}$ or even $\frac{5}{9}$; a degree of re-
striction of the field all round appears. Whether observers
have been right in ascribing these transitory obscurations
to feebleness of accommodation, as is so often done, Nuel
has not been able to determine. Sometimes the patient is
much troubled by rather vehement photopsiæ; in Nuel's
experience these have always been moderate; muscæ
volitantes are often complained of. Frequently on a
second visit, especially if the patient has refrained from
use of the eyes, all the symptoms are found to have
disappeared, and there is nothing pathological visible with
the ophthalmoscope, but the affection is by no means
cured, matters are too serious for that.

By and by, it may be soon, it may be later, sometimes
after a full year or more has elapsed, after these repeated
advances and retreats on the part of the disease, visions
come down to $\frac{5}{36}$, $\frac{5}{60}$, or even less, or the patient may
only be able to count fingers at 1 metre; the field of vision
is more or less restricted all round, most frequently not
extending to more than from 40° to 60° from the fixation
point, always a little more on the temporal side, agreeably
to the form of the normal field. In two cases Nuel found a
degree of restriction very much greater. In the more pro-
nounced cases central colour vision is diminished, in some
complete colour - blindness occurs. But though he has
followed up certain cases for three years, Nuel has seen
none result in absolute amaurosis; and, according also to

Mooren, Brecht, and Rosenmeyer, none of the cases go on to absolute deprivation of sight.

In conducting the functional examination of patients presenting such symptoms, one must make sure to eliminate the possibility of simulation. Especially is this true in regard to a public clinique where it often happens that one patient is present during the examination of another, and they compare notes as to their symptoms and as to what enquiries have been made. Such patients are apt to simulate defective central vision and reduction of the fields, but it is out of the question to suppose that they can appreciate the influence which alteration of the distance makes upon the visibility of the test types and upon the absolute boundaries of the field of vision.

During the early stages, and even for a very considerable period of time, the ophthalmoscopic appearances of the fundus are quite normal. There may be a slight softness or blurring of the papilla, and a slight veiling of the vessels, but hardly more than is consistent with a normal state of affairs. It is an appearance regarding which one should not be very dogmatic, and requiring all the more caution that, according to prevailing ideas, the symptoms complained of suggest the presence of retrobulbar neuritis, a condition which *ought* to be accompanied by slight papillary haze. It is often difficult in cases of retrobulbar neuritis to be certain that any real change is present until we carefully compare the ophthalmoscopic appearances in one eye with those presented by the other, a method obviously inapplicable here. At a later stage, when the amblyopia is more marked, Nuel has seen three conditions : (*a*) a moderate degree of pallor of the papilla, especially at the temporal side, similar to that seen in toxic amblyopia, this is very often found ; in no case has he seen anything which could fairly be called a real atrophy with pallor of the whole disc ; the large vessels are never reduced in size. (*b*) Dilatation of retinal veins : this is of rare occurrence and never more than moderate in degree. (*c*) In one case an obvious degree of peri-arteritis and periphlebitis on the papilla extending for a short way into

the retina. In fact, ophthalmoscopically speaking, the disease begins with a slight degree of atrophy and sclerosis of the optic nerve, but only after the real disease has been manifesting symptoms for a year and more. These ophthalmoscopic changes are quite secondary and late in onset, they are never primary. It is to be noted that several authors have described this condition as a simple atrophy of the optic nerve, sympathetic in origin; but atrophy is too strong a word to use, it "connotes" too much. Nuel confesses that he would not be surprised to see one of these cases go on to complete atrophy, but has never done so, though others appear to have. It scarcely seems proved that these rare cases where atrophy did come on were not really instances of neuritis, visible with the ophthalmoscope; if so, the disease is quite different from that of which Nuel is writing. At first the pupil is normal in size and reacts normally; in later stages it becomes slightly dilated and its action more sluggish. Brecht asserts that phosphenes could be elicited by compression, even in the peripheral lost regions of the field. It has seemed to Nuel also, that phosphenes were producible even very peripherally, it is not impossible that this is the case. In certain of the patients the blind spot was enlarged, in others it was of normal dimensions.

As regards the state of the eye originally injured, Mauthner is disposed to call in question the truly sympathetic character of the affection when the supposed exciting eye is not in a state of irritation; this opinion is a corollary of Mauthner's views as to the pathology of sympathetic mischief, which he regards as being reflex. If it be a *sine quâ non* of a sympathetic lesion that the exciting eye must be in a state of irritation, then Nuel's cases are not of that origin, for the excited eye presented no symptoms such as ciliary pain or injection; but this is not the right way to argue. One ought without prejudice to endeavour to discover whether an affection of one eye ought to be considered to be the consequence of an injury or other lesion of its fellow. Nuel is quite sure that in the

great majority of his cases this is so ; but in the most part of his cases the exciting eye, when it was present at all, showed no vascular or nervous irritation ; the eyes were quite " tranquil," but without exception their optic nerves were in a state of more or less pronounced atrophy, probably as the result of an interstitial neuritis. This is true not only of the nerves of the enucleated globes, they always show some interstitial neuritis, the same fact must be admitted in regard to the atrophied bulbs and those which have become amaurotic ; these nerves display a similar state of matters.

But in certain cases the injured and exciting eye still retained some vision, and then Nuel was able to satisfy himself by functional examination that its nervous mechanism was involved. Although it may appear that the anterior segment alone is implicated in the injury, one can invariably find that the field of vision is reduced. When the pupil is blocked this can be proved by means of a candle held in various positions ; and, in one of his cases where the fundus was visible, the author was able by means of the ophthalmoscope to prove the existence of a certain degree of optic neuritis. Lastly, in those cases it always happens that the exciting eye, if it retain sight at all, is found to be gradually losing ground ; amblyopia progresses, the field becomes smaller and smaller, and the case goes on to complete amaurosis. Everything indicates that in these cases of sympathetic amblyopia the nerve of the exciting eye is in a state of neuritis, proceeding to atrophy. In this connection it is noteworthy that Dr. Cornil, assistant to Professor Nuel, has been able to produce a distinct degree of interstitial neuritis by setting up an aseptic suppuration in the anterior part of the eye of a rabbit.

As regards prognosis, it is possible at any stage of the disease to bring about improvement under treatment, indeed, even *restitutio ad integrum* or nearly so. (?) Some-times this improvement is long-lived and promises to be permanent, but a recrudescence is always to be feared. One requires to follow a case for not less than five years

before one can be quite sure what the end has been, whether bad or good. Compared with sympathetic irido-cyclitis certainly the prognosis is favourable. Sympathetic neuritis, even though decidedly less malignant than irido-cyclitis, is much worse than sympathetic amblyopia. One must not regard the disease too lightly, however ; a patient's " working value " who is in the early stage, is almost *nil* for at least a year or two, perhaps for all his life, should the disease produce a marked restriction of his field and reduction of central vision, as is too often the case. In the early stages vision and field of vision may be good, and yet the obscurations of sight produced by application of the eye prevent the patient from working steadily.

Manifestly the diagnosis must be at times difficult, for the slow and halting onset, the slight and evanescent character of the early symptoms and the absence of ophthalmoscopic changes, all combine to obscure the true state of affairs. And yet from a medical and a medico-legal point of view the importance of a correct judgment is obvious.

At any stage of the disease suitable treatment, viz., mercurial inunction, dark glasses, and repose of the eyes, will produce improvement. But what about enucleation of the injured eye ? Statistics do not show that the removal of the exciting eye is followed by much better results than where the case has been treated without enucleation, but in cases in which the injured eye is blind probably the wisest course is to remove it.

Most authors have regarded the nerve changes as due to an interstitial retro-bulbar neuritis, and analogous to those occurring in toxic amblyopia. Nuel's opinion of toxic amblyopia, however, is that the primary lesion is a de-generation of the nerve fibres. He has conducted some experiments in the dog, producing amaurosis by means of male fern, and found, however, that in a certain number of those cases there is a distinct degree of neuritis, or at least of blurring of the papilla, but microscopically there is no trace of an interstitial neuritis, only of an œdema of the nerve head, which may even protrude into the vitreous as

in a case of true neuritis. This interstitial œdema is consecutive to the destruction of nerve fibres, and real neuritis,
if it occur, comes on later, but it is neither interstitial nor
retro-bulbar. Many of the cases of retro-bulbar neuritis,
and certainly the toxic amblyopia with which one so often
meets in men, are of this nature ; they are instances of a
parenchymatous neuritis, if the phrase be permissible.
Nuel's opinion as to sympathetic amblyopia is that it also
is of this nature. But how does this arise ? By what
mechanism does the exciting eye provoke a destructive
process in the fibres of the sympathising ? The author
cannot accept the nebulous theory of a " reflex neuritis " ;
to Deutschmann's microbic theory (as regards the more
usual cases of sympathetic manifestation) there are certain
objections : (a) because the amblyopia may occur long after
enucleation ; (b) because the disease may arise even when
the exciting eye has received no wound or when a foreign
body has penetrated it in a state of asepsis ; (c) because
the exciting eye may be quite tranquil. Schirmer's bacteriotoxic theory has more to recommend it ; but Nuel prefers to
make one for himself. He says the exciting eye always
is found to be suffering from an interstitial neuritis of
greater or less intensity ; this neuritis *may* mount up to the
chiasma, though it has not yet been proved to extend so
far. At all events the atrophy of the nerve fibres may
extend to the chiasma and further. In the cases of poisoning by male fern there occurred, later on, a sclerosis of the
neuroglia which affected the nerve up to the chiasma, and
also a distinct degree of cellular infiltration—of interstitial
neuritis ; this neuritis, however, hardly extends beyond
the superior limit of the optic canal. In the case of sympathetic amblyopia one or other of these processes, perhaps
both, propagates itself as far as to the chiasma and from
there extends into the other nerve.

In the ordinary toxic amblyopia and in amblyopia from
male fern, then, the poison attacks in the first instance the
nutritive cell (nerve cellules of the retina) while in sympathetic amblyopia it is the optic nerve fibres which are
first involved. And if it can be proved that under certain

conditions this interstitial neuritis can extend beyond the limits of the optic canal and up to the chiasma, Nuel thinks his views as to the pathology may fairly be considered proven.

W. G. Sym.

TH. JONNESCO (Bucharest). Total Bilateral Extirpation of the Cervical Sympathetic as a Treatment for Exophthalmic Goitre. *Annales d'Oculistique, March*, 1897.

Total bilateral resection of the cervical sympathetic is an operation which has never yet been performed in man so far as Jonnesco is aware, but he suggests an operation which he has had occasion to practise recently no less than six times. The sixth case is, he says, too recent for him to be able to predicate much as to it, but the other five patients consisted of two suffering from exophthalmic goitre, two from " essential epilepsy," and one, a little girl, who was both choreic and epileptic. Jonnesco deals with his subject under the headings of (1) the causes which have led him to devise this new operation, (2) its *technique*, (3) its results, and (4) the indication for its performance.

(1) Two series of facts have led the author to suggest this very serious intervention, which, *à priori*, appears condemned by well-known physiological facts :—

(a) The record of attempts made at complete or partial resection of the cervical sympathetic. In certain epileptic patients, Alexander, in 1889, carried out complete bilateral resection of the superior cervical ganglion. Bogdanick in 1893 extirpated the middle cervical ganglion, and when he found this absent, removed a piece of the trunk of the sympathetic ; others have performed somewhat similar operations. Chipault, to whose treatise (*Chir. Opérat. du Système Nerveux*) the reader is referred for more details, says that these operations are not so very difficult, and that in no case have any of those vaso-motor and trophic altera-

tions of the face manifested themselves which one might have anticipated. In twenty-four cases in which he carried out the operation indicated above, Alexander had seen no such results. At the most, he says, when performing the operation on the two sides on different occasions, he has observed a slight contraction of the pupil and a very limited degree of depression of the upper lid on the side first operated upon ; neither of these is, of course, appreciable— they are so slight—when both sides are operated on at the same sitting, or when the patient is contrasted with a normal individual. There are no trophic alterations of the eye, no modification of the temperature of the face, no change in the pulse or in the rhythm of the heart. Kummel, on the other hand, has observed contracted pupil and nasal hyper-secretion on the same side after extirpation of one superior cervical ganglion. Vaksh, after division, by a method of his own, of the vertebral plexus and the trunk of the nerve above the inferior ganglion, has recorded similar phenomena. Chipault adds that it may fairly be said that these operations have not been without beneficial effects upon the course of the epilepsy ; and in regard to his own results at any rate (for no other surgeon has had sufficient experience to justify a general conclusion), Alexander feels justified in stating—" among my 24 cases 6 may be considered cured, 10 have received benefit particularly as regards mental symptoms, 4 have remained *in statu quo*, and none have been rendered worse ; 2 have died subsequently to the operation, though not from the direct result of it." We have thus 25 per cent. of cures, some of the cases being very encouraging, for a considerable proportion of these cases had been, if one accepts Gowers' classification, in a bad way as regards prognosis. Chipault decides that the operation is in suitable cases amply justifiable, and should be performed with good hope in a larger number of cases.

In 1895 Jaboulay, of Lyons, divided the cervical sympathetic in a female epileptic patient with the object of modifying the intra-cranial circulation, and in the same year the same surgeon, in a case of exophthalmic goitre,

isolated the middle ganglion, dividing four or five efferent twigs, then he divided the main trunk below the ganglion on both sides. He obtained in this case a marked improvement in symptoms, the exophthalmos completely disappeared, the heart beats came down from 152 per minute to 120 and then to 100, the goitre diminished, the circumference of the neck, which had been 40 centimetres before the operation, fell to 37, visual acuity returned again to normal, the palpitations and the trembling passed away.

(b) The lesions of the cervical sympathetic in epileptics, whose nerve trunks are in a state of intense hyperæmia, a lesion which obtains also in exophthalmic goitre. Many authors have come to the conclusion that the primary lesion in Graves' Disease is situated in the cervical area of the great sympathetic ; this lesion, which may attack either the trunk or the ganglia, particularly affecting the lower and middle of these, consists of an atrophy of the nerve cells, either alone or accompanied by surrounding proliferation. But these lesions can hardly be said, at any rate, to be constant, since various other observers have failed to discover any such.

Encouraged by the success of these attempts at section and at partial removal of the sympathetic, attempts which have been productive of insufficient therapeutic results, and by the (at least moderate) constancy of these lesions in presence of those symptoms, Jonnesco has been led to devise a new and more radical operation, consisting in the complete ablation of this nerve of the cervical sympathetic, which, as regards exophthalmic goitre at least, appears to be the principal agent of the different symptoms which characterise this disease. It is only after having established the harmlessness of the new procedure in the case of Graves' Disease, that the author has proceeded to the further development of his idea, the complete bilateral removal of the cervical sympathetic in epileptics.

(2) Under the heading of the *technique* of the operation, Jonnesco gives a very careful and detailed description of the steps, for information upon which one ought to consult the original article. He tells us that it is not rare

to find the inferior ganglion united closely to, or fused with, the first and even the second dorsal, forming a gang-lionic mass of, it may be, 3 to 4 centimetres in length, extending down into the thorax. In other cases the gang-lion, of the dimensions of a small nut, is found closely applied to the neck of the first rib and the body of the vertebra, and held in place by numerous vigorous twigs both efferent and afferent. Having cleared the parts thoroughly, one pinches up the main trunk above, and having defined the branches distinctly, the surgeon then divides, one by one, the afferent and efferent twigs per-taining to the ganglion; in this way the bilateral nerve and the cardiac branches are divided. Even when the friable character of the trunk and its close investiture by veins render the actual removal of the ganglion impossible, as sometimes is the case, one ought at least to divide the afferent cardiac branches and the vertebral nerve. The author has found in the course of his operations, that resec-tion of the superior ganglion is accompanied by contraction of the pupil on the same side, by congestion, sometimes very pronounced, of the face, by lachrymation and abun-dant secretion of saliva. These phenomena disappear rapidly, and in a very short time after the operation everything returns to its normal condition, and there is nothing to indicate the absence of the cervical sym-pathetic.

(3) Under the heading of "results," the author gives details of five cases in which he has operated with success, two of these being goitrous, two epileptic, and one hystero-epileptic; for details the original paper ought to be consulted, but in outline they were as follows :—

(i.) A widow, aged 30, with all the symptoms of exoph-thalmic goitre, which had come on in the last two months. There was exophthalmos, more marked in the left side; the discs appeared injected and there was slight visible arterial pulsation in the retinæ; the thyroid was enlarged, the neck circumference measuring 37 cm.; irregular action of the heart, pulse a little rapid, slight tremulousness. After operation the pulse became a little accelerated, exoph-

thalmos disappeared, the neck measured 35 cm., no tremulousness.

(ii.) Girl, aged 16, strumous. Onset of disease in spring, patient appearing first in August with marked exophthalmos, decided goitre (33 cm.), rapid heart (pulse 110) and slight tremulousness. After operation exophthalmos almost disappeared; pulse 108; goitre distinctly less (31 cm.)

(iii.) Male, aged 19, epileptic, having fits every five days at longest. After operation no fit for fifteen days; feels stronger.

(iv.) Male, aged 30. Takes fits several times a day; after operation no attack for five days.

(v.) Girl, aged 12. Chorea and hystero-epilepsy. This began six years ago, and she has attacks every week, two occurring in the twenty-four hours. Up to the twelfth day after operation no recurrence; the choreic movements much less.

Jonnesco seems thoroughly satisfied with these results of an operation for which the reviewer feels obliged to confess he can find in the history of the cases no real demand, and which is necessarily far too serious to be undertaken in cases so little urgent. The effects, moreover, do not strike him as being peculiarly brilliant as contrasted with those obtained by milder methods.

(4) Encouraged by these results, by the proof that the operation can be satisfactorily performed without immediate danger, and with apparently permanent benefit, the author is disposed to apply the treatment in other cases. He was much struck by discovering, contrary to his expectations, that the tachycardia, in place of diminishing after section of the sympathetic, seemed rather to increase. Even in the epileptic patients there was perceptible quickening of the pulse, a fact which he explains thus : The traumatism caused by resection of the cervical sympathetic acting through the cardiac branches, may influence the ganglia of the cardiac and, with a cardiac plexus, the effect would be to exaggerate the contractions of the cardiac muscle, whence would arise increased rapidity of the pulse rate.

Perhaps this effect may be heightened by the unavoidable section of the cardiac twigs of the pneumogastric.

As regards permanent benefit, Jonnesco can hardly dogmatise as yet ; the immediate result in Graves' disease by disappearance of the exophthalmus and diminution of the goitre is rapid and very marked.

In conclusion, the author lays down the following propositions :—(1) Resection of even the whole of the cervical sympathetic on both sides does not necessarily involve ulterior troubles. (2) This operation, though not easy, can always be attempted. (3) In exophthalmic goitre, a disease whose characteristic signs appear to take their origin largely, if not completely, in the cervical sympathetic, bilateral resection of this is "absolutely indicated," whether with or without ligature of the thyroid arteries. " The results obtained in my cases justify this proposition " in Jonnesco's opinion, but others who are more timid operators, or whose views as to pathology and prognosis do not coincide with this bold if not rash surgeon, may not perhaps be disposed to follow in his footsteps.

W. G. Sym.

H. HEINERSDORFF (Breslau). Metastatic Abscesses in both Occipital Lobes ; bilateral Amaurosis without other Focal Symptoms. *Deutsche Medicinische Wochenschrift*, 1897, No. 15.

The patient whose case forms the subject of this paper, when he came under Dr. Heinersdorff's observation, was a healthy-looking man, aged 52. Five weeks previously he had been under treatment for some lung affection, which rapidly got well. During recovery, however, he had for a few days redness and swelling over the inner side of the left fore-arm, with some constitutional symptoms. This rapidly subsided (under treatment by iodide),

and was attributed by the medical attendant to periostitis. Three weeks after the lung affection he began to notice increasing dimness of vision of both eyes. A week later this suddenly increased, so that he could no longer count fingers, and he had some pain in the head. There was a return of feverishness, and signs of an abscess appeared in the left groin. On admission, eight days later, the eyes were normal in appearance and movements. The pupils were equal, of medium size, and acted definitely to light, though the movement was rather sluggish and of small extent. The ophthalmoscopic appearances were normal, except for slight hyperæmia of the discs. Vision amounted to perception of light only, and projection was uncertain. The patient answered questions in a somewhat hesitating manner, and seemed a little dazed. He complained of nothing except the loss of vision. He was transferred to the surgical department for treatment of the abscess in the groin, and a week later Dr. Heinersdorff was surprised to hear of his death, the operation having been followed by increasing somnolence, and finally coma. On the day of his death he had vomited once. At the necropsy the right lung was found strongly, the left slightly, adherent to the parietes; there was a small abscess in the liver, containing greenish inodorous pus. The base of the brain was covered with greenish purulent lymph, especially over the fourth ventricle and the occipital convolutions. Both lateral ventricles were filled with greenish stinking pus, and the posterior horn of each communicated with an abscess cavity in the occipital lobe, that on the left occupying nearly the whole of the lobe, that on the right only its anterior two-thirds. The third and fourth ventricles contained turbid semi-purulent fluid. There were no changes in other parts of the brain. It appeared probable that the abscesses in the occipital lobes, from their bilateral occurrence, were metastatic and not primary, and that they had broken through into the ventricles during the last days of life. The source of the septicity of the pus was not apparent, nor was it examined bacteriologically.

Owing to the extended nature of the lesions, this case throws no light on the localisation of the visual centres; but the author thinks it worth recording as the only example hitherto published of central blindness due to a lesion of this kind, those which are on record having always been the result of softening following embolic processes. He gives a brief review of the already published cases of "central" blindness, that is, in which the lesion is situated above the light-reflex arc, so that the pupillary reaction is retained, and there is no affection of motility or sensation.

The number of such cases, as might be expected, is small (seven); and even of that number all are not unexceptional. In two (by Nothnagel) there was complete blindness, and isolated centres of softening were found in both occipital lobes; but no mention is made of the condition of the pupils, or of motion and sensation generally. In one (by Oulmont) there was diffuse softening of the occipital lobes, the pupillary reaction, though feeble, was retained, motion and sensation were intact "except for a contraction of the left arm"; and in a similar case of Fürstner's there was, at any rate at first, paresis of the left side.

In Berger's case, however, there was simply blindness (perception of light only being present), which came on suddenly with a sensation of giddiness; the pupillary reaction was retained, and there were no other symptoms; *post-mortem* there was found bilateral softening of the cortical and sub-cortical layers of both occipital lobes. In Déjerine and Vialet's case there was sudden blindness without even any symptom of an apoplectic seizure; death occurred from an intercurrent affection, and there was found a well-defined lesion of the inner face of each occipital lobe.

In the case recorded by Willbrand, in which *post-mortem* there was extensive softening of the optic radiations, there was at first blindness (the pupils acting slightly to light), but later the condition resolved itself into left-sided hemianopia merely. This illustrates the fact that the blindness

in all these cases must be regarded as a double hemianopia; in some of them, probably, an extremely small central portion of the field is left.

These are all the cases which Dr. Heinersdorff can find recorded in which the lesion was an organic one. But "central" blindness is, of course, much more frequently met with as the result of (a) *functional*, and (b) *toxic*, causes. In the former class the pupillary reaction is undoubtedly generally present; Dr. Heinersdorff considers it still doubtful if it is ever abolished in purely functional cases. Of the latter class, the best known example is uræmic amaurosis; here, too, the pupils generally act to light, but the poisoning may extend beyond the cortex to the conducting tracts and then the reflex may be lost. The rarer cases of central blindness accompanying certain fevers (scarlatina, measles, typhoid and intermittent) are probably also toxic in character.

W. G. Laws.

COLLEGE OF PHYSICIANS OF PHILADELPHIA, OPHTHALMOLOGICAL SECTION.

Wm. F. Norris, M.D., in the Chair.
March 16, 1897.

Dr. Wm. T. Shoemaker reported a *Case of Traumatic Sub-Conjunctival Dislocation of the Lens*. A woman fell, striking her right eye against the thumb-latch of a door. Two days later the lens mass was seen resting upon the sclera in the upper inner ciliary region. The cornea was hazy, anterior chamber partly filled with blood, the iris retracted and tremulous, and presenting a large coloboma. No fundus reflex could be obtained. The lens was removed by a conjunctival incision. No sutures were used and no reaction followed. At present the scleral scar is firm and discoloured, and the coloboma unchanged. The remnants

of the torn capsule are faintly visible in the pupil. Vision with a correcting glass is $\frac{20}{50}$.

Dr. W. F. Norris stated that staphyloma frequently followed injuries of this character when the edges of the ruptured sclera were not united by sutures. The fact that the pupil is crossed by a few opaque fibres of capsule shows that the capsule was ruptured at the time of the accident.

Dr. G. C. Harlan referred to a case of dislocation of the lens under the conjunctiva, in which he had seen the patient occasionally for several years. There was useful vision and the eye was not interfered with as it remained quiet. In another case he had removed the lens by incision. It was found that the rupture of the sclera had been closed chiefly by the adherent lens capsule, and a cystoid cicatrix resulted, followed later by a considerable staphyloma. In all the cases he had seen the lens had been forced out through the upper corneo-scleral junction. This is usual in this accident, which is generally the result of a blow from a blunt instrument, such as the fist or a billet of wood, striking the ball below and forcing it against the roof of the orbit. The sclera is ruptured by contrecoup and the lens is extruded.

Dr. M. W. Zimmerman reported a *Case of Bilateral Pigmented Tumours, Probably Cysts of the Ciliary Bodies.* Mrs. J., aged 59, with good family history, had been under observation since April, 1893, when she was seen by Drs. Harlan and Jackson in consultation. In the lower and outer quadrants of both eyes the iris was pushed forward by dark brown tumours presenting into the pupil between the lens and iris. The tumours, examined under mydriasis, were not nodulated and apparently not attached to the iris. Since the tumours could not be removed by iridectomy, no operation was advised, and no treatment other than weak eserin solution was used. During the past four years the tumours had changed somewhat in outline, and that in the right eye very slightly increased in size. In other respects the eyes were normal. There was no irido-

dialysis or other injury to the iris tissue. Vision equalled one-third of the normal.

Dr. Harlan had agreed that the iris did not participate in the disease. The case was decidedly obscure, but he believed that it would prove to be ciliary sarcoma. The absence of an important symptom of neoplasms in the region, namely, inflammatory reaction, was noted. Usually the growth is adherent to the adjacent iris, and as it progresses into the pupil it carries the margin of the iris with it, producing iridodialysis. He thought, however, that this might occur later. But as it had not done so in four years, and as there had been but little change in the condition of the eyes, he thought now that the presence of a malignant tumour was hardly possible.

Dr. G. E. de Schweinitz read a communication on *Angioid Streaks in the Retina*. After briefly reviewing the literature and referring to his previous case, reported to the Section on Ophthalmology and to the American Ophthalmological Society, Dr. de Schweinitz presented a second bilateral example of extensive, branching, pigmented striæ in the retina, the anastomosing bands being easily traceable to their points of origin in hæmorrhages. The patient, a brother of his previous case, was a working man, 50 years of age, who had been a hard drinker but who had suffered from no notable illness. Examination of the heart, kidneys, and blood yielded negative results. The pathology is obscure, and we are at present unable to say more than that these cases represent an unusual metamorphosis of retinal hæmorrhage.

Dr. Edward Jackson suggested a *Modification of the Sight-hole of the Ophthalmoscopic Mirror*, to avoid all annoying reflexes from it. This consisted in making the sight-hole merely through the silvering, leaving the glass intact, and then cementing a thin piece of glass at the back of the sight-hole, extending beyond it on the silvering to protect it from dust. The dust falling upon either surface being easily removed, complete and permanent freedom from the luminous cloud caused by reflexes from the sight-hole can be obtained. The plan had been first applied to the

mirror for skiascopy, and later adapted to that of the ophthalmoscope.

Dr. Wm. M. Sweet presented a novel apparatus for *determining the situation of Foreign Bodies in the Eye by the Roentgen Rays.* By means of three horizontal rods of aluminium, each with a rounded extremity to be adjusted to the inner and outer canthus and to the centre of the upper lid, held in position on the patient's face by a band similar to that of the head-mirror, shadows are cast on the sensitive film. He prefers the double film to the glass photographic plate on account of its flexibility and lightness, and because mistakes in diagnosis incident to imperfections in one film or plate are avoided. The Crooke's tube, held thirteen inches upward and backward opposite the parietal bone, emits rays that pass through the external orbital wall, the tissues surrounding the ball, and the ball itself, and are received on the film, which has been thrust as far as possible into the inner canthus, and maintained in position by a holder.

Two exposures are made, one with the tube on a line with the eye, and the other at an angle of $25°$ with the horizontal plane.

The approximate position of the foreign body is determined by attaching the apparatus to an upright support and so placing a lighted candle that the shadow cast by the indicators will fall similarly to those thrown by the Crooke's tube. A small object is then held before the candle in such a position that its shadow is identical to that of the foreign body. A record having been made of this line of shadow, the candle is moved until the shadows of the indicators correspond to those on the second negative. The object is again employed and a second impression recorded. The point where the two lines of shadow of the test object cross should be the situation of the foreign body in the eye. Knowing the distance of the centre of the cornea from a fixed point of the apparatus, the distance that the foreign body in the eye lies behind this point (and therefrom its approximate position) may be measured.

Dr. G. E. de Schweinitz presented a *Case of Suspected Sarcoma of the Ciliary Body* in a girl aged $6\frac{1}{2}$ years, with the symptoms of cyclitis, associated with marked *iris bombé*, the upper and outer portion of the bulging iris being of a greyish-black colour, while the lower portion was of a greenish-blue. These symptoms had existed, according to the history, for about three months, with occasional exacerbations of the cyclitis and periods of increased tension. The pupil was occluded and there was a small central corneal scar, but history of injury could not be obtained. Skiagraphic examination was negative. The bulging of the iris had notably increased during the last few weeks, and symptoms of sympathetic irritation were evident in the sound eye.

DIPHTHERITIC CONJUNCTIVITIS.[1]

By Myles Standish, M.D.

Ophthalmic Surgeon, Massachusetts Charitable Eye and
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Last year I read a paper before this Society on the importance of having a bacteriological diagnosis in cases of diphtheritic conjunctivitis. The principle brought out was that there were many cases of this disease which did not follow the classical, clinical picture that we have all called diphtheritic conjunctivitis, and consequently many more destructive processes were diphtheritic than we had hitherto been led to suppose.

Since writing that paper I have felt much more strongly than formerly the importance of having an early bacteriological diagnosis, for the reason that in my experience in these cases, if they are treated early with antitoxine, they run a much milder course and the cornea is generally saved, with resulting preservation of vision.

Moreover, I have come to regard with suspicion rapidly progressing infiltrations of the cornea, unassociated with any very strongly marked conjunctivitis, for, upon bacteriological examination in such cases, I have several times found that the pathological process was due to an infection with Klebs-Loeffler bacillus, and I am about to report several cases selected from a number which I have seen during the past year.

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[1] Read before the American Ophthalmological Society, April, 1897.

13

Ophth. Review. Vol. XVI., No. 187. May, 1897.

The first case illustrates the benefit to be received from an early and persistent use of antitoxine in a typical case of diphtheritic conjunctivitis. The second illustrates a diphtheritic infection in which the conjunctival disturbance was comparatively slight, and the corneal disturbance severe and rapid.

The first patient was a healthy boy, aged 3 years; his eyes were first noticed to be red on the morning of September 21, and he was seen by me on the morning of September 23. There was considerable lacrymation and slight injection of the bulbar conjunctiva of each eye. The palpebral conjunctiva of both lids of each eye was red, swollen, and of a soft velvety texture, resembling the condition often seen at one stage of trachoma. There was little, if any, pus, and I was at a loss to know just what the condition was. At the end of twenty-four hours there was practically no change, but on the evening of the 24th the velvety texture had become smoother, and I began to have a suspicion of what the condition might be.

The next morning there was a distinct membrane on the conjunctiva of the upper lid of each eye, and the swelling of the lids was so great that they projected nearly half an inch over the lower lids upon the cheek. At noon that day specimens taken from the conjunctiva gave an abundant and pure culture of the Klebs-Loeffler bacillus. The culture tubes were inoculated for further study, which after twenty-four hours in the thermostat gave a typical growth of Klebs-Loeffler bacilli.

At 3 o'clock on this afternoon Dr. J. L. Morse, at my request, injected $3\frac{1}{2}$ cubic centimetres of the city of Boston antitoxine, of which a full adult dose is 5 cubic centimetres. By 7 o'clock in the evening the membranes upon the conjunctiva were shredding off, and the thick, brawny upper lids seemed slightly more flexible. Upon the following morning—the 26th—there was no membrane upon the conjunctiva of the right lid, and on the left lid it all shredded easily off, except a small patch in the centre of the upper lid. By 12 o'clock, however, the condition of affairs

had changed markedly. The lids were again stiff and
board-like. The conjunctiva was thick with a brown and
brawny infiltration over the tarsal surfaces, and a thick
membrane had reappeared over large areas. There was
also a patch of membrane 3 millimetres in diameter on the
bulbar conjunctiva at the sclero-corneal margin on the left
eye. Meantime, 5 cubic centimetres of antitoxine had been
given at 10 o'clock. By 3 o'clock in the afternoon the
condition of the lids had again greatly improved; they
were soft and almost flexible. The membrane was only
hanging by shreds to the conjunctiva, and the condition
was practically the same as on the night before. This
improvement continued throughout the night, but by 12
o'clock on the next day the stiffness had returned to the
lids and a thin bluish membrane covered both upper lids,
running back for the first time behind the retro-tarsal
fold.

The patch of membrane had returned at the sclero-
corneal margin and the epithelium had peeled off the
cornea over an area of 3 or 4 millimetres in diameter
contiguous to the patch of diphtheritic membrane in the
conjunctiva. The following morning the margin of the
area where the epithelium was denuded became distinctly
infiltrated, and the whole denuded surface of the cornea
was opaque. It then became apparent to me that the
antitoxine in this case exerted an immediate and favourable
effect upon the progress of the disease ; that this effect was
well marked in four or five hours after the antitoxine had
been injected, but at the end of twenty hours there had
been in each instance a recrudescence of the pathological
process ; therefore, it seemed to me logical, in order to
control the disease absolutely, that injection should be
made in this case, at least, once in sixteen hours. Accord-
ingly this was done, and 3 cubic centimetres of antitoxine
were injected every sixteen hours from September 27 until
the 30th — in all nine injections. From the time that this
treatment was instituted the eyes progressively recovered.
The membranes shredded off, the brawny infiltration no
longer returned. The epithelium was replaced on the

cornea before the last of the membrane sloughed out of the conjunctiva of the upper lid, which occurred about 5 o'clock on the afternoon of September 30, leaving a deep, well-defined ulcer.

The eyes made a rapid recovery, and there was no leucoma left on the cornea at the seat of the lost epithelium and subsequent infilration of the corneal tissue. On October 4 a profound urticaria appeared ; this lasted forty-eight hours, and as it subsided there was a sudden rise of temperature, with drowsiness and considerable loss of strength. This condition lasted six days, after which the child made a rapid convalescence.

It is, perhaps, worth while to state that there was no albumen in the urine at any time.

The local treatment consisted of cold applications to the lids and an ointment of mercury, red iodide or yellow oxide, to which was added $\frac{1}{2}$ per cent. pilocarpine after the cornea became infected, a lotion for the purpose of cleanliness, and a bland ointment on the lid after each cleaning.

The second case illustrates a diphtheritic infection in which the conjunctival disturbance was comparatively slight and the corneal disturbance rapid and severe.

It is that of a young woman, aged 27, a domestic servant, who came to consult me on November 30, 1896, and reported that while her eyes had always given her more or less trouble, they had been quite well for a year or more, until two or three days before coming to me when lacrymation appeared, accompanied by some redness. The condition of her eyes upon examination was found to be as follows :—The bulbar conjunctiva of each eye was injected, and the lower conjunctival *cul-de-sac* in the right eye was markedly injected and slightly infiltrated. The conjunctiva of the upper lid was comparatively normal in appearance.

At the margin of the cornea above there were several elevations of the conjunctiva each about 2 millimetres in diameter, infiltrated and resembling in appearance large

phlyctenulæ, except that there was no pustule present. There was a large superficial ulceration with a very grey base, covering about half of the cornea lying close to the small infiltrated conjunctival patches. An ointment of red iodide of mercury and atropine was given, and the patient seen again on December 2, when the patch of infiltration above the ulcer seemed to be about the same.

On the next visit, December 7, there was a very small amount of muco-purulent discharge, characterised by broad flakes of mucus filled with pus, which appeared to be slightly attached to the sclero-corneal margin in each case. The corneal tissue at the site of the ulcer was much whiter in appearance and seemed to be deeply necrotic. In the other eye, while there was little, if any, infiltration of the conjunctiva of the lids, several rounded elevations of infiltrated tissue had appeared in the conjunctiva some-what resembling the gross appearance of large phlyctenulæ. The patient was advised to enter the Carney Hospital, and did so on the following day. Cultures were taken from the conjunctival sac, but owing to a mistake in manipulation the tubes became infected, and the result was consequently negative.

On the morning of December 9 the condition of the right eye was as follows. There was a brawny, dense infiltration of the conjunctiva, practically surrounding the cornea. The appearance resembled that due to a burn of the conjunctiva with hot metal. There was no swelling of the lids ; no infiltration of the palpebral conjunctiva ; no false membrane upon either bulbar or palpebral conjunctiva. A greyish infiltration of the corneal tissue appeared at the lower portion of the cornea, and there was hypopyon in the anterior chamber.

The necrotic tissue was touched with tincture of iodine and an ointment of red iodide of mercury used.

In the corner of the left eye various infiltrations appeared opposite the conjunctival elevations before spoken of as resembling phlyctenulæ, and new cultures were made from each eye. Twenty-four hours later these showed abundant growths of Klebs-Loeffler bacilli. Antitoxine

was ordered, but the hospital authorities, becoming alarmed, transferred the patient immediately to the new hospital for contagious diseases—in the southern department of the Boston City Hospital—where the bacteriological diagnosis was confirmed at the time of the transfer of the patient. Large areas of both corneæ looked deeply necrotic, and it seemed to me that there could be no other result than total loss of the cornea of each eye; nevertheless, after two injections of antitoxine the corneal destructive process stopped and only one small perforation occurred. Large portions of the cornea cleared up entirely, although there were several dense cicatrices left on each eye.

From this case it will be seen that a most rapid and destructive corneal ulceration occurred from a localised diphtheritic conjunctivitis on the globe, while at the same time there was absolutely no diphtheritic infection of the conjunctiva of the lids.

Nor has this case been unique in my experience during the past year. I have seen three others, notes of which I have not at hand, but in which the sloughing ulcer of the cornea was the principal process, with no infiltration or swelling of the lids and only slight localised infiltration of the conjunctiva contiguous to the ulceration ; cultures showed that the Klebs-Loeffler bacillus was undoubtedly the pathological agent, producing ulceration of the cornea.

In all these cases injection of antitoxine arrested the necrosis of the cornea.

The third case, which is an interesting one, is that of a boy, 8 years of age, who was admitted to the Massachusetts Charitable Eye and Ear Infirmary on April 22. There was great swelling of both upper lids so that they projected markedly over the lower ones. A greyish-brown brawny infiltration of the conjunctiva rendered the lids stiff and boardlike. This infiltration extended up on to the bulbar conjunctival margin of the cornea ; there was

a slight watery discharge of thin pus, but no shreds of mucus.

This case presented very much the typical picture of diphtheritic conjunctivitis, yet shreds taken from the conjunctival sac revealed gonococci and no Klebs-Loeffler bacilli. No growth appeared in the culture tubes.

From these cases, and others which I have seen within the past year, I have arrived at the following conclusions :—

(1) In all cases of purulent conjunctivitis, the diagnosis should depend upon the bacteriological investigations, and not upon the clinical appearance.

(2) That diphtheritic conjunctivitis may be present in localised areas without the conjunctiva being affected as a whole.

(3) That ulcers of the cornea with exceedingly rapid necrosis of the corneal tissue may be due to infection with the Klebs-Loeffler bacillus.

(4) That antitoxine favourably affects both the conjunctival disease and the corneal necrosis.

R. HILBERT (Sensburg). The Pathology of the Colour-Sense. *Sammlung zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde. Karl Marhold, Halle a. S.,* 1897.

This short monograph, "the first attempt at a pathology of the colour-sense," is mainly clinical in character. One is inclined to wish it had been purely so ; the industry which the author has bestowed on the collection of clinical material could not fail to produce an interesting paper, and has moreover given us a most exhaustive bibliography, which will be a great assistance to anyone pursuing the subject ; but the clinical observations themselves are pre-

faced by the following assertion, " Pathological colour-perceptions are by their nature subjective in character, since they come into existence without the stimulus of any real objective colour," and this generalisation seems to have dominated in a somewhat undue manner the author's view of the clinical facts.

Proceeding to the facts themselves, they are arranged under two main headings : (1) Irritation of the Colour-perceptive Centre, or Pathological Colour-perception ; (2) Paralysis of the Colour-perceptive Centre or Colour Blindness.

The pathological colour perceptions are again divided into the following groups: (*a*) those which occur in the course of the psychoses or other brain affections ; (*b*) those associated with disease of the nervous apparatus of vision ; (*c*) chromatic " secondary perceptions " (photismata) ; (*d*) true chromatopsia, and (*e*) a variety of it taking the form of coloured spots in the visual field ; (*f*) those resulting from the toxic action of certain chemical substances ; (*g*) abnormal responses of the colour-perceptive centres under certain conditions to normal stimuli.

(*a*) The subjective sensations of colour which occur in the course of diseases affecting the higher cerebral centres may take the form of a colouration of the whole visual field, or of moving coloured images of varying form and size ; they are most frequent in the earlier stages of the disease, though they are not confined to these, and may occur in lunatics completely amaurotic from atrophy of the optic nerves ; they are strictly analogous to the visual (form) hallucinations which occur in these subjects. Allied to them are the coloured auræ which not unfrequently precede epileptic or hysterical seizures ; and somewhat similar appearances are occasionally observed by otherwise healthy persons suffering from eye troubles. Hence the distinction between these cases and those of group (*b*) (colour perceptions associated with disease of the nervous apparatus of vision) is not complete, at any rate as regards those pathological colour-perceptions which may occur in the course of inflammatory affections of the optic

nerve or retina ; and Hilbert inclines to the view that these also are essentially central in their causation " due to stimulation of the visual centre, which itself is probably in a condition of exalted excitability from the condition of its end-organ, the retina." The same holds good, at least to some extent, for affections of the choroid, in the course of which the retina is practically always involved, and also in the so-called " hyperæsthesia optica," in which colour impressions frequently occur as the result of trifling alterations in the circulation. But in a different category, as being objective and not subjective in origin, must be placed those pathological colour-sensations which are caused by the development of opacities or other changes in the refractive media, in the course of a retinitis, iritis, glaucoma, &c.

(c) The author gives a summary of what is known of the curious phenomenon of " secondary perceptions." The varieties which have been described are (1) colour and form-sensations produced by sounds *(Schallphotis-men)* ; (2) sound-sensations produced by light *(Licht-phonismen)* ; (3) colour sensations produced by odours *(Geruchsphotismen)* ; (4) colour-sensations produced by tastes *(Geschmacksphotismen)* ; (5) colour and form sensations produced by pain, temperature and touch impressions *(Photismen der Hautsensibilität)* ; (6) colour and light sensations produced by forms *(Formphotismen)*.

Photismata may take the form of the filling of the whole visual field, or part of it, with light or colour ; or of the appearance of rays of light or colour proceeding from certain objects. The liability to secondary perceptions is always congenital, and often hereditarily transmitted ; the form it takes in any one individual is always the same ; it is more marked in childhood than in later life, and always more evident the less the attention of the individual is directed to it. The experiments of Urbantschitz throw a certain amount of light on the condition. He found that during continuous stimulation of one special sense there was increased reaction to appropriate stimulation of other special senses. Thus, there was increased acuteness of the

colour-sense whilst a musical note was sounded, a higher note producing a greater effect than a lower one ; covering the eyes diminished the acuteness of hearing, while it was raised by the action of bright light on the retina; there was a change, both quantitative and qualitative, in the perception of musical tones under the influence of light of different colours ; painful sensations of heat were assuaged by looking at yellow and blue, intensified by looking at red and green, and so on. Analogous results were obtained by Eppstein, though of course there was considerable variation between individual cases.

The theories which have been proposed for the explanation of secondary sensations may be divided into the anatomical and the developmental; speaking generally, the former may be said to assume the existence of abnormal nerve paths, whereby stimuli passing to one perceptive centre overflow so as to reach another perceptive centre ; while the latter regards the peculiarity as a partial reversion to a type lower in the scale of specialisation, where one nerve-centre serves for the reception of impressions from several sense-organs. Hilbert has had the opportunity of observing a case which differed in some respects from any other recorded, in that the associated sensation (that of a well-defined bundle of rose-coloured rays, called up by the striking of a clock) was only produced when the subject was in the condition of dropping asleep ; and he considers that this speaks for the developmental theory, since it is reasonable to suppose that in the condition between sleeping and waking, when the control of consciousness is temporarily removed, the primitive oneness of the visual and auditory centres may so far re-appear that one stimulus may develop both sensations.

(d) *Chromatopsia.*—Of seven pages devoted to the discussion of the different forms of chromatopsia it is somewhat surprising to find that Hilbert gives but one to *erythropsia*, as to which our knowledge is certainly by far the most definite and extended ; and also that there is no mention in the text of Fuchs's recent contributions to the subject, although they are duly referred to in the biblio-

graphy. In fact the treatment of the subject of chroma-
topsia is distinctly one-sided, and consists mainly in the
marshalling of evidence for the author's view of the purely
central nature of the affection. He appears to think that
the old view that the erythropsia which followed cataract
operations was due to dazzling of the retina was sufficiently
disposed of when it was observed to occur in cases in
which the lens was intact : " the aphakia has nothing to do
with the phenomenon ; but on the other hand it is undeni-
able that every person after being operated on for cataract
is in a condition of excitement, between hope and fear,
which may well, in nervously disposed individuals, give rise
to erythropsia as a central reflex." Now, although this
reasoning is not very cogent there is further evidence, some
of which is adduced by the author, for the theory of the
central nature of erythropsia. On the other hand, Fuchs's
evidence as to the part played by retinal exhaustion is com-
plete and convincing. Are the two views irreconcileable ?
The reviewer is inclined to think not, and has pointed out
elsewhere with reference to some of the ocular phenomena
of neurasthenia, of which erythropsia is one, that the
processes of nutrition of the retina which lead to its
recovery after stimulation are not purely local or automatic
in character, but are very distinctly under the control of the
higher cerebral centres.

Of the rare condition of *xanthopsia*, or yellow vision,
Hilbert has been able to find thirteen cases recorded. In
the earliest recorded it followed on a mental shock ; the
second was in a patient who suffered from helminthiasis
(? santonin) ; the third was a patient of nervous tempera-
ment ; in the fourth case a bullet wound of the face, which
did not injure the eyes, caused temporary one-sided blind-
ness and yellow vision ; another also appeared to be a
traumatic neurosis ; others followed insolation, typhus
fever and influenza ; the author observed a girl in whom
increased activity of a chronic middle-ear discharge was
accompanied by headache and temporary yellow vision,
and also a remarkable case in which yellow vision occurred
regularly for twenty-four hours before an epileptic attack ;

and finally it has been recorded as a symptom in choroido-retinitis. " In all these cases," Hilbert remarks, " is the central origin of the xanthopsia manifest." The symptom of xanthopsia in cases of detached retina (which, however, he has never himself observed) he would refer to the yellowish colour of the sub-retinal fluid, and relegate it consequently to the class of objective pathological colour-perceptions.

Of blue vision or *cyanopsia* the number of cases is even more limited. Hilbert has been able to discover five. In a patient with symptoms of retinal hyperæsthesia in the early part of the day everything looked yellow, later of its natural colour, and finally blue. A second patient, a woman of gouty and irritable temperament, had blue vision lasting for some months after an iridectomy for glaucoma. A third was in a case of ague and subsided under quinine. The fourth was a young girl with coryza vasomotoria, who after treatment with the galvano-cautery saw everything blue. In the fifth case, recorded by the author himself, albuminuric retinitis was present ; but he considers that in this, as in the others, the blue vision must be regarded as central in origin.

Among ten recorded cases of *chloropsia*, or green vision, one occurred in a young woman who stated that for several weeks everything had appeared red, but on waking one morning this had disappeared and everything looked green ; another was a patient who had had cataracts removed and saw red out of doors but green in a room ; in a third case (Mackenzie's) green vision followed a wound with prolapse of iris ; a patient of Hilbert's, a Jewess, had green vision during an attack of hemicrania ; Chauveau reported of himself that every morning on waking he saw surrounding objects green ; Knies observed green vision with retinitis ; while of three other cases no details are given.

The only recorded case of violet vision (*jacinthopsia*) is one reported by Colman in the *British Medical Journal*, 1894. There was middle-ear disease, with hallucinations of sight, hearing and smell.

Hilbert thinks that the greater frequency of red and

yellow vision in comparison with blue and green lies in the fact that of all colours red and (to a less extent) yellow produce the most lively impression on the sensorium, and consequently in conditions of irritation of the nerve centres the perception of these colours will be the more readily called forth.

(e) Of the rare variety of coloured vision in which *coloured spots* are seen in the visual field, the most interesting case is perhaps that of M. Savigny, member of the French Academy of Sciences. " He saw from time to time bright spots before his eyes, from six to ten inches in diameter, their outlines being sometimes rectilinear, sometimes curved, sometimes jagged. Many were white with a silky sheen and bordered by golden-yellow or silver-white edges; others were yellow, orange, red, or black, with similar margins; while others again were composed of concentric coloured zones with wavy edges and shaded with fine black lines. These appearances were of a beauty and delicacy such as art could hardly reproduce. The largest and finest of the spectra were general'*y* towards the periphery of the visual field."

In the few other cases in which any details are given, there was reason to suppose the presence of an ocular lesion of one kind or another; and Hilbert is inclined to regard this variety as distinguished from true chromatopsia by being peripheral and not central in its origin.

(f) *Coloured Vision Produced by Certain Poisons.*—Scattered up and down in medical literature are many observations on the greenish-yellow vision produced by ingestion of *santonin*. Mari found that the appearance of all the colours of the spectrum was altered as if by the addition of yellowish-green to them, and that the spectrum was somewhat shortened. In the somewhat similar yellow vision produced by *picric acid* on the other hand, the spectral colours were practically unaltered with the exception of green. A case of yellow vision from absorption of *chromic acid* has been reported; and of violet vision from poisoning by a species of fungus, and also from *haschisch*. Hilbert has seen a case of yellow vision on recovery from the

stupor of *carbonic oxide* poisoning ; and the occasional occurrence of yellow vision in *jaundice* is well known. Finally cases of erythropsia after the ingestion or instillation of one or other of the *atropine* bodies have long been recognised. The author makes no remark on the possible bearing of the dilatation of the pupils in these cases, except that in describing a case of his own in which the instillation of five or six drops of a half per cent. solution of sulphate of duboisin caused everything to look scarlet-red, he comments on the fact that this occurred whether the medicated eye was covered or not as a signal proof of the central origin of this subjective colour-perception. The patient in this case was a woman, " anæmic and very neurasthenic." Atropine used later produced no erythropsia.

That the origin of the coloured vision is central in all toxic cases the author considers as beyond doubt.

(*g*) *Abnormal After-images.*—A few cases have been recorded of individual exceptions to the law that the after-image of any colour is the complementary tint. Thus Brücke mentions a child to whom the after-image of red appeared violet instead of blue-green ; and Hilbert mentions that a medical friend of his own, whose colour-vision is perfect, presents exactly the same peculiarity. In another case the after-image of red was (on a white ground) a brilliant white.

The author has made an interesting personal observation in this connection ; on one occasion he noticed accidentally that the after-image of a petroleum lamp, which in general appeared to him of a dark blue tint, presented the unexpected appearance of a light green. He subsequently found that this took place on more than one occasion after a day of unusually exhausting work, and points out the analogies of the phenomenon with the alterations of colour-perceptions in the psychoses and toxæmic conditions.

Chromatophobia.—In an addendum to this section of his subject the author considers the condition of chromatophobia, though it does not fall in strictly with his definition of a pathological colour-perception, " since it has not

a basis in a demonstrable pathological condition of any organ, and its origin is not independent of an actual objective colour."

Chromatophobia is a condition in which the subject, on looking at a particular colour, experiences disquieting and unpleasant sensations, and in marked cases giddiness and headache. Seven cases have been published in which the exciting colour was red, two in which it was blue, and two in which it was white. One of the patients was colour-blind, one an albino, one had optic nerve atrophy ; all appear to have been of neurasthenic type, and the con-dition has probably its basis in an over-irritability of the nerve centres. But this is not a complete explanation of it, and further observations might well be made, especially as it is by no means so rare as the small number of recorded cases might seem to indicate.

In summing up the facts of this section of his subject Hilbert considers that the following positions may be accepted as demonstrated :—(a) Pathological colour-per-ceptions are always subjective ; (b) They arise centrally, as conditions of irritation of the colour-vision centre ; (c) They cannot be originated by external conditions, but may be intensified by them. He further holds that the facts described may be best, indeed, can be only, explained on the hypothesis of a colour-vision centre distinct from the light-perceptive centre. But when he says that there is only one author (Holden) who does not accept this view and omits even the briefest outline of any alternative theory, we think that he fails to do that justice to views differing from his own which might be expected in a paper so general in its aim as this one.

The second portion of the paper, dealing with *defects* of colour perception, is less interesting than the first. The matter is arranged in three sections :—(1) Congenital colour-blindness; (2) Temporary paralysis of the colour-vision centre ; (3) Destruction of the colour-vision centre. In the second of these, that of temporary paralysis of the colour-vision centre, the author includes not only the

14

temporary colour-blindness which has been observed in hypnosis, hysteria, and after certain brain injuries, but apparently also the large class of the toxic amblyopias and certain cases of loss of colour-vision from looking at the sun. But his treatment of this part of the subject is so brief that one would scarcely feel justified in assuming that he regards the latter varieties of colour-blindness as due to paralyses of the colour-vision centre, although they are placed under this heading, were it not that in his remarks on the following section the same mode of view is apparent ; for under the heading of destruction of the colour-vision centre are grouped cases due to brain injury (including vascular lesions), late stages of optic atrophy, general paralysis, tumours of the optic nerve, foreign bodies in the eye-ball, and acromegaly, with the comment that such cases do not differ in their nature from those of congenital colour-blindness, although they generally show more or less contracted fields and diminished visual acuteness.

The account of congenital colour-blindness is too short to contain more than a summary of well-known facts ; and the same remark applies to the discussion of the theories of colour-vision with which the paper concludes.

W. G. LAWS.

E. Valude (Paris). Repeated Hæmorrhages into the Orbito-palpebral Tissue in a Hæmophiliac. *Annales d'Oculistique, March,* 1897.

Cases of spontaneous hæmatoma of the lids are rare in any case, and in the adult they are almost confined to patients suffering from arterio-sclerosis, while those of spontaneous hæmatoma of the orbit, though less exceptional, are none the less very unusual. M. Panas was only able to discover records of seven cases, including one of his own. In patients who are a little up in years, the cause of a spontaneous hæmatoma will usually be discovered to be the presence of arterio-sclerosis (as in de Wecker's patient, a man of about 60 years of age); while in female patients in middle life the possibility of menstrual irregularities and vicarious hæmorrhages must be considered. In the case of a child again, hæmophilia may be the causative condition, as was observed by Zehender, or an abnormal state of the digestive tract, as was observed by Panas, whose patient was a young subject who suffered from dilatation of the stomach with vomiting and other symptoms due to dyspepsia. To tell the truth, the pathogeny of spontaneous hæmatoma of the orbit or of the lid is very obscure, a different cause having been assigned in each of the cases recorded ; the case described below by Valude is therefore of special value, inasmuch as both orbit and lids were affected, and there was no doubt as to the cause being hæmophilia.

Madame C., aged 34, a woman of spare and feeble aspect and in only moderate health, though free from any organic disease, complained of frequent hemicrania, with habitual flatulent dyspepsia and obstinate constipation ; she was in a decidedly nervous condition. Objective examination revealed no abnormality of the respiratory or of the vascular system. She complained of a sensation of breathlessness now and then, and had suffered from swelling of the legs, but there was no cardiac murmur to be heard at the date of Valude's examination. The urine was normal. On careful investigation, however, it was found that the

patient must be regarded as a hæmophiliac, without under standing that term to imply any very precise nosological meaning. The conclusion was unavoidable, however, for the patient stated that all her life she had been very liable to hæmorrhages ; the slightest cut was difficult to heal, and a pustule on the face, which had its scab removed, had bled copiously and long. A circumstance still more characteristic was related by the patient, viz., that if she merely used friction to the face with a towel which was a little rough, this was quite sufficient to produce a hæmorrhage. On one occasion, five or six years ago, after such friction of the neck and face, blood flowed so very freely that it was actually necessary to apply firm com presses and perchloride of iron before the hæmorrhage could be stopped. On another occasion the patient con sulted a physician as to some discomfort which she experienced in her mouth, and he discovered in the region of the soft palate a submucous sac full of blood, which he wisely did not incise and which gradually dis appeared without leaving any trace. These circumstances leave no room for doubt that we have to do here with a case of hæmophilia. Dr. Chauffard's examination of the blood revealed a decided slowness of coagulation—indeed the blood did not begin to clot till the lapse of fifteen minutes or thereby. As regards the constituents of the blood, nothing pathological was to be found ; both white and red corpuscles were normal in appearance and in numbers both actual and relative ; in spite of these facts the delay in coagulation is characteristic.

From time to time the following conditions were observed as the case progressed. On September 30, 1896, the right cheek, eyelids and forehead became swollen, and at the same time there was severe pain in the upper inner region of the right orbit ; two days later an ecchymosis appeared at the seat of pain, and then gradually disap peared. Ten days afterwards exactly the same train of symptoms reappeared—the swelling, the pain, and the ecchymosis ; at the same time there was a little rise of temperature and some nausea. It is noteworthy that

neither of these occurrences coincided with the menses, which came on as usual and at the customary interval, the patient being quite healthy as regards this function.

On October 13, Valude tapped the sac of fluid blood which he found projecting at the upper and inner portion of the orbit, removing about two grammes of blood somewhat dark in colour, but otherwise unaltered. Notwithstanding the application of a pressure bandage he found it needful to repeat the paracentesis three days later, removing on this occasion about one gramme. Little by little the firm nodule, which remained for some time, was disappearing, when about the end of November it began again to enlarge and become slightly painful, with the reappearance of a bluish discolouration. On this occasion, however, there was no definite collection of blood—the effusion was more diffused. By the beginning of the following February—to make a long story short—it had disappeared, and in its stead a hæmatoma of the gum had again formed.

W. G. Sym.

F. W. Marlow (Syracuse). On the Use and Non-use of the Occlusive Bandage in Cases of Heterophoria. *Ophthalmic Record, March*, 1897.

The author first draws attention to the fact that the onset of convergent strabismus is often observed to occur in childhood during the wearing of a bandage over one eye for injury or disease, or during any affection which temporarily prevents binocular vision. He then states it as his experience that if a bandage be worn for two or three days after a tenotomy, which at the time of operation apparently almost exactly corrected the strabismus, when the bandage is discontinued the result is by no means so perfect as anticipated. From these two facts Marlow argues that latent heterophoria would very likely be often rendered manifest by a more thorough application

of the equilibrium tests, especially the old "cover test," with its complement, "the parallax test." He quotes two cases: One, a patient with severe sick headaches and asthenopic symptoms; the symptoms at first were relieved by correction of his H. As., but finally returned and were undoubtedly connected with one of the eyes. The left eye was excluded by wearing a ground glass in front of it for three days; at the end of this time a left hyperphoria of 1° was disclosed, shown both by the rod test and Stevens' phorometer. An hour later, both eyes having been in use, a left hyperphoria of $\frac{1}{2}°$ only was present; a prism of $\frac{1}{2}°$, with its base up, was incorporated with the R. As. spectacle lens. Five months later he reported himself as much improved; there was very little headache, and he could read for two or three hours, but had discomfort after reading in the evening. At this visit more hyperphoria was manifest, and the strength of the prism increased.

Marlow also quotes the case of a man who years before had suffered from diplopia and asthenopia, which had been got over by glasses for his refractive error. A burn of the right lids necessitated his wearing a bandage over this eye for a week; at the end of this time he had asthenopic symptoms; he had noticed diplopia on removing the bandage to have the lids dressed. At the end of the week Marlow found, R. hyperphoria 1° to 2°, exophoria 5° to 6°. A week later all symptoms had disappeared.

On the above experience Marlow advocates that after tenotomy no bandage should be employed. If the eye is covered it assumes its position of rest, there is no tension or straining of the tendinous fibres induced by the desire for binocular single vision, and the reattachment may take place at a point by no means the most favourable. If the binocular functions are allowed full play, they compel the eye to occupy the position in which single vision is possible, and thereby help to determine the point at which reattachment of the tendon shall take place.

Marlow's remarks apply apparently to cases of muscular asthenopia, unrelieved by accurate correction of refraction error, and treated in two cases reported, by partial teno-

tomy, at a time when latent strabismus is increasing, and tending to become manifest.

In this country partial and graduated tenotomies are not very generally believed to be satisfactory operations; the influence of the desire for binocular single vision would presumably be less if the eye operated on were partially amblyopic, or its vision, from any cause, much defective. The instructions often given to an out-patient on whom tenotomy has been performed, are " to wear the bandage till he gets home, and then leave it off." If this advice be acted on, the advantages which Marlow refers to would presumably be secured.

J. H. FISHER.

MAX LINDE. On Contusion of the Globe, with Special Reference to Commotio Retinæ. *Centralblatt für praktische Augenheilkunde, April*, 1897.

The first satisfactory account of the lesion now known as commotio retinæ was given by Berlin (1873); previous to that time all sorts of various injuries had been grouped under this heading. He produced experimentally in dogs the familiar greyish-white discolouration of the retina, described it with exactitude, and observed that along with it there was almost always reduction of central vision. He was at a loss for an explanation of so great a diminution of central vision as occurred—out of proportion to the visible lesion—and considered that a degree of irregular astigmatism must also be produced by the trauma, to which some of the defect of sight was due; he showed, too, in connection with this, a condition of pupil refusing to dilate under atropine and (in rabbits) hæmorrhage in the ciliary body. Because he found anatomically blood effusion from choroidal vessels lying behind the discoloured retina, he considered the term amblyopia traumatica would probably be less inexact than commotio retinæ. Others have worked at this subject also. Hirschberg showed that the symptoms might depend on an ischæmia of the vessels, and

pointed out in particular the condition of excentric vision and the irregular boundary of the white area. In 1887 Ostwalt published several cases which displayed a peripheral scotoma and good central vision. It has been observed that the whitened area lies for the most part along the track of the vessels, and for this reason it may be not unlikely that the œdema lies chiefly in superficial fibre layers, rather than in the deeper rod and cone layer. One very interesting case has been published of a girl who, six months after injury, showed an atrophic decoloration of disc and yet had normal vision and field of vision.

Makrocki (1891) considers that there is in these cases absolutely no constant symptom, that even the white opacity may be absent ; the defective vision is, in his opinion, due to disturbance of circulation in the nerve head, brought about by the trauma, and he regards the opacity of the retina as due not to an œdema but to molecular changes in the finest twigs in the nerve fibre layer.

Linde believes that cases of commotio of various degree are much more common than one is apt to suppose, and that because the symptoms are often not very imperative, many patients do not present themselves at once ; owing to the great variations in the symptoms, too, some cases are missed. He dislikes the terms in common use—commotio retinæ, because clinically it is incorrect, limiting the lesion as it does to the retina ; albedo retinæ is similarly an unsuitable term, and œdema retinæ is open to the same objection ; he prefers the expression contusio bulbi, which will admit injuries of cornea, iris, &c., as well as of the retina.

Often when one examines carefully an eye which has been struck and in which there is subconjunctival ecchymosis, some deep - lying circumcorneal injection may be observed ; this is due to stasis and dilatation of the vessels of the ciliary body.

Commotio corneæ shows itself in recent cases only by stippling of the epithelium, but by and by there comes on a more mottled opacity which interferes with vision. In certain cases the substance of the cornea seems to become

opaque, an appearance which is probably due to the filling of the lymph paths with turbid fluid ; these appearances pass off in a few days.

Commotio uveæ, as already noted, is marked by dilatation of the circumcorneal vessels ; the iris, too, is hyperæmic, and the pupil unshapely, excentric, and sluggish or immobile. Sometimes only half the pupil will dilate under atropine, sometimes no effect is produced by the drug. The choroid is easily torn, giving way under compression of the globe, the result being ruptures and hæmorrhages.

The lens is in some cases to blame for a traumatic astigmatism, a condition which Berlin ascribed to injury of the ciliary body, but which may be due to a flattening of the surface and a stretching or tearing of the zonule ; contusion of greater severity may bring about rupture of the zonule and subluxation of the whole lens.

In the vitreous humour, bluish opacities and hæmorrhages, which owe their origin to the ciliary body, are often to be seen.

The optic nerve may itself suffer in a case of severe contusion ; small striate hæmorrhages are seen on its surface and immediate neighbourhood, but the more delicate changes are of course not visible with the ophthalmoscope, and behind the region accessible to us there may be more serious lesions, *e.g.*, partial rupture or apoplexy.

But the most striking cases are those in which the weight of the injury has fallen upon the retina. After the pressure and consequent ischæmia pass, a swelling occurs ; circulation is slow, and from the vessels a serous fluid transudes ; and if the injury has been very severe, leucocytes make their way out and we have the picture of an inflammation. These changes naturally result from the compression of the retina. With the ophthalmoscope we observe a more or less sharply circumscribed, often spotty opacity of a whitish grey, or silvery colour, which comes on very shortly after receipt of the injury, and tends principally to show itself along the course of the vessels ; these appear sometimes enclosed in a sheath or network

of such patches.   In this process the retina is not distinctly
thickened, at all events not sufficiently so to show with the
ophthalmoscope.   Berlin thinks that this grey colour only
appears where there is a choroidal hæmorrhage, but this
seems improbable, seeing that the haze disappears in much
less time than a blood effusion takes to absorb ; the
cause is in all likelihood a true œdema of the nerve fibre
layer.   This œdema is most manifest at the regions of the
blow, and of *contre-coup*.   In connection with this matter
it must be observed that the ordinary rules as to *contre-coup*
applicable to the bony cranium, do not exactly suit for the
more elastic globe ; it is the soft vitreous humour, too,
which is the agent that compresses the retina.   The
globe, which becomes deformed when a blow is struck
upon it, requires time to do so, and this deformation
seems to occur most readily when the blow is delivered
by an elastic instrument ; agreeably to this Linde be-
lieves that he has observed the signs of *contre-coup* more
obviously after the impact of a cork or a ball than of a
piece of metal.   Details of seventeen cases are then
given by the author, which had been seen in Hirschberg's
clinique.

W. G. SYM.

H. D. BRUNS (New Orleans). Case of Quinine
    Amaurosis. Observations extending over Ten
    Years. *American Journal of Ophthalmology, January,*
    1897.
S. C. AYRES (Cincinnati).   Quinine Amblyopia.
    American Journal of Ophthalmology, January, 1897.
HERBERT HARLAN (Baltimore).   Quinine Am-
    blyopia. *Ophthalmic Record, March,* 1897.

Three cases of quinine amaurosis have been recently
reported in American journals. The first is by H. D.
Bruns, in the *American Journal of Ophthalmology*. The
patient was a little girl, aged 3, to whom five grains
of quinine were given by the rectum every three hours

until thirty grains had been administered in all. This treatment was prescribed for remittent fever. The fever was overcome, but blindness resulted ; the date and mode of its onset are not given, but the blindness was complete when attention was first directed to the eyes. The pupils were dilated almost to the maximum, and responded very slightly to artificial light concentrated by a lens. Discs very white ; vessels, especially the arteries, small and thin ; no hæmorrhages or other fundus changes. Treatment was by hypodermic injections of strychnine. In two days there was undoubted perception of light ; in two days more the pupils were decidedly smaller, and during the succeeding fortnight her father noticed that vision came back gradually but steadily, till he considered her sight and pupils to be normal. Examined at the end of five months the pupils seemed a little dilated, discs still pale, with small retinal vessels. Nearly two years from the date of onset the pupils, Bruns says, were still certainly larger than normal, about two-thirds of the maximum. Discs bluish-white and arteries small. Ten years after the attack the V. of each eye, with very considerable mixed astigmatism corrected, was $\frac{10}{40}$, or with both together, $\frac{20}{30}$. She could read the finest print when held close. The discs and vessels were as last noted ; the pupils, perhaps, a third larger than normal, but they seemed quite sensitive to light.

Bruns mentions a case he had seen in a boy of 15, in the year 1878, and which he had the opportunity of re-examining in 1895. At this date he considers any ophthalmic surgeon from an examination of the fundi would pronounce the case to be one of optic atrophy in the last stages. With correction of refractive error this patient read $\frac{20}{20}$ and Sn. No. 1 readily. Bruns adds that the fields unfortunately were not taken, but says that though doubtless contracted, the loss was not enough to make itself felt, subjectively, as an annoyance. Central colour perception of red and green was good in both the patients.

In the same number of the *American Journal of Ophthal-*

mology (January, 1897) a case of quinine amblyopia is re ported by S. C. Ayres. The patient was a girl, aged 7, suffering from varicella, with unusually high temperature. Large doses of quinine were given—on the first day 24 grs.; the second 56 grs.; and the third 26 grs. After the last dose the child became unconscious, and remained so for two or three days, and, on returning to consciousness, it was observed that she was totally blind; apparently she had no perception of light for a day or so, and then vision began to return. Later on it was observed that her colour sense was impaired. Ayres only saw the patient two months later, when both discs were pale, and V. $= 0.6$ in each eye; colour sense seemed to have returned.

The case in the *Ophthalmic Record* (March, 1897) is re ported by H. Harlan. A man, aged 34, an excessive drinker, took a handful of 2 gr. sulphate of quinine pills; a little later a few more, and in an hour he finished the remainder of a bottle of 100, which he had purloined from a chemist's counter. Half an hour later, at another chemist's, he obtained an ounce of laudanum, and after taking this went to the hospital. The stomach pump was used, and his tale of laudanum poisoning being thus con firmed, he was given permanganate of potassium, and $\frac{1}{120}$ gr. of atropine was injected hypodermically. The pupils were noticed to be dilated. The next morning he said he was quite blind; the pupils were widely dilated. No history of the quinine having been given, his complaint of blindness was disbelieved, and the mydriasis attributed to the atropine used as an antidote for the morphia. The following morning he mentioned for the first time that he had taken 200 grains of quinine. Harlan saw him four days after his attempt to poison himself. There was no perception of light; pupils wide; discs white; vessels the merest threads. The retina was not perfectly trans parent, and had the appearance caused by embolism of the central artery, except that there was no red spot at the fovea. Strychnine was ordered, and taken for one week. In ten days there was some action of pupils to light, and in three weeks R. V. $= \frac{15}{29}$, L. $\frac{15}{24}$. Read 4 J.,

and matched colours perfectly; field in each extended only 10° in all directions from the fixation point. Four weeks from the onset R. V. $= \frac{15}{29}$, L. V. $= \frac{15}{16}$; read 1 J., colour seemed limited to the very centre. The fields were better, and seven weeks after the toxic dose extended to about 15° above and below the fixation points, 40° in the nasal direction, and 30° in the temporal. R. V. $= \frac{15}{24}$, L. V. $= \frac{15}{16}$.

At the close of his paper Ayres quotes de Schweinitz, who reported the results of some experiments made on dogs with quinine to the American Ophthalmological Society in 1891. De Schweinitz says the influence of the drug on the retina and optic nerve in dogs was very similar to that observed in human beings. In his *résumé* he says: "That we have thickening and changes in the walls of the vessel, organisation of a clot, the result of thrombosis, widening of the infundibulum of the vessels as the result of the constriction of the surrounding nerve fibres, presenting appearances not unlike a glaucomatous excavation, and finally practically complete atrophy of the visual path, including the optic nerves, optic chiasma, and optic tracts as far as could be traced."

J. H. Fisher.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

E. Nettleship, F.R.C.S., President, in the Chair.
Thursday, May 6, 1897. Clinical Evening.

New Method of Mounting Museum Specimens.—Mr. Priestley Smith showed specimens illustrating a new method of mounting eyes in formol, which could be completed in forty-eight hours. The preparations were permanent and exhibited clearer definition than those preserved in glycerine jelly.

Three Specimens of Detachment of the Retina.—Mr. Ernest

Clarke exhibited three mounted specimens of detachment of the retina in different stages. In the first there was no inflammatory thickening; in the two others there had been inflammation, and in one of these there had been in addition the formation of cysts in the detached portion.

Sarcoma of the Iris.—Mr. C. Devereux Marshall described and exhibited sections of a case of sarcoma of the iris. There was a solid unpigmented mass occupying the position of the lens and growing from the posterior surface of the iris; it proved microscopically to be a small round and spindle-celled sarcoma. Mr. Lawford, who removed the globe, said the eye was glaucomatous. There was no anterior chamber, and a white mass occupied the centre of the pupil simulating opaque swollen lens substance. It was while operating for the relief of this supposed condition that the real nature of the case became apparent and the eye was excised.

Symmetrical Disease of the Macula.—Dr. Batten brought forward cases illustrating symmetrical disease of the macular region in two brothers due to hereditary syphilis and arising at the age of 14. Vision was greatly reduced in both instances. Failure of sight had been gradual, and one other member of the family—a girl—was unaffected.

Mr. Jessop mentioned a somewhat similar case in which vision failed at the age of 21; it began with œdema at the macula, followed by pigmentary change. Disturbance of vision had been sudden, first in the left and then in the right eye. This was also in a male, but there was no evidence of hereditary syphilis, though the patient was improving slowly on Donovan's solution.

Mr. Lawford referred to a case of a girl in whom vision had failed suddenly at the age of 15, that of the right eye failing from $\frac{6}{6}$ to $\frac{6}{60}$. Minute light dots appeared at the macular region and persisted three weeks later. There was then no pigmentation. The case was still under treatment.

Obstruction of the Cavernous Sinus.—Mr. F. Eve and Dr.

F. J. Smith communicated particulars of a case of obstruction of the cavernous sinus. After rheumatic fever, three years before, proptosis and double papillitis had come on, with headache and vomiting. There was, in addition, tenderness of the scalp and turgidity of the veins in the lids, with irregular general oculomotor paralysis, congestion of the fundi, and contraction of the fields of vision in both eyes. The obstruction may have been due to malignant disease of the pituitary body or to tubercle. Syphilis was excluded. Vision amounted to $\frac{6}{24}$ and $\frac{6}{12}$ in the right and left eye respectively.

Translucency of the Cornea after Application of the Galvano-Cautery. Congenital Absence of the Puncta Lacrymalia.—Mr. Doyne showed : (1) The effect of the galvano-cautery in conical cornea. The instrument had been employed deeply three times and the resulting nebula was very faint. The operation had been performed at the age of 18, and the patient, a young woman, was now aged 26. Vision was $\frac{6}{18}$. (2) Congenital absence or abnormality of the puncta lacrymalia without epiphora.

Proptosis occurring on Stooping or Compressing the Jugular Vein.—Mr. Lang exhibited a peculiar case of exophthalmos proptosis occurring on stooping or compressing the jugular vein. Sometimes the proptosis occurred spontaneously ; it then lasted some hours or days, was more painful, and was attended with disturbance of vision. There was now some post-neuritic atrophy.

Mr. Thompson, under whose care the girl had been, said the condition had begun at the age of eleven years.

Mr. Priestley Smith reported the case of a man in whom the left eye was sunken, but protruded when he bent forward ; the condition had existed many years and had followed an injury to the head in boyhood. It was probably due to a varicose state of the ophthalmic vein.

Mr. Treacher Collins mentioned the case of a young man he had recently seen whose sight failed on stooping. The eye projected and the lid also dropped, the deformity disappearing when the patient raised himself up.

Dr. Habershon referred the phenomenon to periodic turgescence of the orbital vessels.

The President referred to a case recently reported in an American journal.

(?) *New Growth in the Yellow Spot Region.* — Mr. C. H. Walker showed a case of (?) new growth in the yellow spot region in a middle-aged man whose sight had become defective two months ago. There had been no change since. The vision only amounted to "fingers" at thirty inches; there was a central scotoma, but no peripheral contraction of the field. The swelling at the macula was half as large again as the disc, and was raised 2 D. above that of the rest of the fundus; it might either be a new growth or an inflammatory or cystic swelling.

Mr. Adams Frost thought the condition was one of central senile choroiditis.

Mr. Holmes Spicer suggested that the doubt as to the cystic nature of the swelling might be settled by a puncture of the protrusion under ophthalmoscopic observation.

The President said he had seen cases exhibiting a similar appearance; he thought they were instances of senile choroiditis. One case at least was followed by atrophy, and it would be interesting to know the sequel of the present one.

Retinitis Punctata Albescens. — Mr. John Griffith showed a case of retinitis punctata albescens. A man, aged 48 had had night blindness all his life. His parents were first cousins. One sister had a similar condition. The vision equalled $\frac{6}{36}$; the colour vision was normal: the optic disc was pale and waxy; the central region was crowded with very small, white, discrete dots; and the pigmentary changes were very slight.

Mr. Treacher Collins had had a similar case in a young lady whose parents were first cousins and two of whose grandparents were first cousins. She had night blindness: there were also white spots in the fundus, as in this case.

The President said that the point about these cases was that they did not get worse, as the pigmentary ones did.

THE OPHTHALMOMETER AS A GUIDE IN SUBJECTIVE OPTOMETRY.

By George J. Bull, M.D., Paris.

In all cases of refractive error it is incumbent on the ophthalmologist to examine for astigmia, and to deter-mine its extent when present ; for in the first place he cannot measure the exact degree of myopia or hyper-metropia unless he also measures the astigmia, and in the second place the astigmia may be the cause of certain symptoms relievable by the use of correcting cylinders.

It is usual to consider the dioptric system of the eye as composed of only three refracting surfaces, the anterior surface of the cornea and the two surfaces of the crystalline lens. Recent researches,[1] however, have shown that a fourth surface, namely, the posterior sur-face of the cornea, has also some importance, for the index of refraction of the cornea differs from that of the aqueous humour more than was formerly supposed. This difference is shown by the fact that the image of a lamp-flame reflected by the posterior surface of the cornea is sufficiently bright to be distinctly visible.

In the present paper, however, I shall use the term " corneal " astigmia only in speaking of the astigmia of

[1] See Tscherning, " L'influence de la surface postérieure de la cornée sur la réfraction oculaire." *Bull. Soc. Française d'Oph.*, vol. x., p. 328.

15

the anterior surface of the cornea, measurable by the ophthalmometer, and I shall include under the term " intraocular " astigmia that of the three other refracting surfaces—the posterior surface of the cornea, and the anterior and posterior surfaces of the crystalline lens.

Astigmia of the whole eye—total astigmia, as it is called-—is the resultant of the special astigmia of all four refracting surfaces ; or, in other words, is the resultant of corneal astigmia and intraocular astigmia.

To determine the amount of the intraocular astigmia, we have recourse to such instruments as Tscherning's ophthalmophacometer. In the year 1891 Tscherning examined my right eye with his instrument and found:—

In the anterior surface of the cornea an inverse astigmia of 0·74 D.

In the posterior surface of the cornea an inverse astigmia of 0·57 D.

In the anterior surface of the crystalline a direct astigmia of 1·09 D.

In the posterior surface of the crystalline an inverse astigmia of 0·95 D.

Taking into account the respective direction of the principal meridians of the four refracting surfaces, he has found the resultant of the four values to be a total inverse astigmia of 1·05 D.

Tscherning has examined a few other eyes (one of which differed from mine in showing 2·36 D. of direct astigmia in the anterior surface of the cornea), and has found in all of them that the crystalline and the posterior surface of the cornea produced together an inverse astigmia.

My own experience leads me to believe that this is the general rule ; for the comparison of the amount of the corneal astigmia with that of the total astigmia in a large number of cases, shows that the difference may be roughly expressed as being equal to an inverse astigmia of about 0·75 D.

Again, if it be true that the total astigmia of the eye is the resultant of an intraocular inverse astigmia and of the corneal astigmia, we should expect that the meridian of greatest refraction of the whole eye would not always coincide with the meridian of greatest corneal curvature. My experience justifies this inference.

Moreover, as the addition of two convex cylinders of equal value with a certain angle between their axes produces a combination, having its meridian of greatest refraction perpendicular to the bisector of the angle, we should infer that an analogous effect would occur in the eye as the resultant of an intraocular inverse astigmia and a direct or oblique corneal astigmia, and that if the corneal astigmia be of low degree, the meridian of greatest refraction of the eye will incline more towards the horizontal than does the most curved meridian of the cornea. Experience has shown me that this is commonly the case. It has also shown, as might be inferred from the experiment of adding a strong convex cylindrical glass to a weak one at another axis, that when the corneal astigmia is high the meridian of greatest refraction of the eye commonly coincides with the meridian of greatest corneal curvature.

The instruments and the calculations required to determine directly the degree of intraocular astigmia are at present too complicated to allow of their general use in the consulting room. The corneal astigmia can, however, now be measured with quickness and accuracy, thanks to the ophthalmometer of Javal and Schiötz, and the purpose of the present paper is to consider how far the inferences to be drawn from a knowledge of the corneal astigmia are of value in everyday practice. It is true that the measurements obtained by the ophthalmometer give us figures very different from the total error we are required to

correct. I have found, however, that there are a few simple rules by the application of which the measurements of the ophthalmometer may be made to furnish a most useful guide. These rules are the natural sequence of the general considerations as to intraocular errors to which I have just alluded. Speaking broadly, it may be said that the total astigmia is approximately equal to the amount indicated by the ophthalmometer, expressed as myopic astigmia, combined with an inverse myopic astigmia of 0·75 D. From this and from the considerations already mentioned, it follows that :—

(1) When the corneal astigmia is direct, and above 1 D. we may expect the total astigmia to be also direct, but of lesser amount.

(2) When the corneal astigmia is direct and about 0·75 D. we may expect to find an almost total absence of astigmia by subjective examination.

(3) When the corneal astigmia is direct and 0·25 D. subjective examination will probably reveal an inverse astigmia of about 0·50 D.

(4) When there is no corneal astigmia we may expect to find by subjective examination an inverse astigmia of about 0·75 D.

(5) When the corneal astigmia is inverse, we shall generally find by subjective examination a higher amount of inverse astigmia.

(6) When the corneal astigmia is oblique and direct rather than inverse, a lower degree of astigmia will be discovered by subjective examination. The reverse of this is true when the obliquity tends to bring the case into the class of inverse astigmia.

(7) When the corneal astigmia is oblique and of low degree, the meridian of greatest refraction of the whole eye commonly inclines more towards the horizontal than does the meridian of greatest corneal curvature.

(8) When the corneal astigmia is of high degree the

meridian of greatest corneal curvature coincides with the meridian of greatest refraction of the eye.

The above deductions are, of course, given only as approximations to the truth. The ophthalmometer should never be considered as a substitute for the subjective method of examination. It should be looked upon as a guide and as a check, enabling us to conduct the subjective examination on logical principles.

The first glance at the images of the "mires" of the instrument as we rotate the arc shows whether there is any corneal astigmia. The difference of level of the "mires" or their overlapping enables us to estimate the amount of error. We see immediately whether the astigmia is regular or irregular, for when the images of the "mires" are of normal shape and of equal size, and when the principal meridians are perpendicular to each other, we conclude that the astigmia is regular. When, on the contrary, the images are deformed or when one is smaller than the other, we know that the astigmia is irregular.

The information given by the ophthalmometer is often more trustworthy and useful than that given by skiascopy or any other objective method of examination, and it is needless to add that the cornea may be measured by the ophthalmometer in cases in which opacities in the media render skiascopy quite impossible. When the corneal astigmia is irregular the ophthalmometer often enables us to judge of the expediency of endeavouring to correct the error by cylindrical glasses. In this communication, however, I shall not touch upon the services which the ophthalmometer has rendered, and will still continue to render, in the study of the changes in corneal curvature which occur after wounds of the eye, and during the progress of keratoconus, pterygium, &c. I will confine myself here to the practical value of the instrument in cases of regular astigmia.

It is a great advantage to know beforehand the amount of astigmia that we may expect to find. The rules already stated enable us to infer in many cases that the total astigmia does not exceed 0·25 or 0·50 D. Such an inference is often of value. For example, when we consider it in connection with the visual acuity of the patient and with the circumstances and symptoms of his case, we may judge whether it be expedient to determine the exact amount of astigmia by the subjective method. Again, if we are seeking the cause of the bad visual acuity, it informs us that astigmia may be excluded, and thus we are helped to find the real cause. It is hardly necessary to add that it saves us from a wearisome and fruitless search with cylindrical lenses.

When, on the other hand, the ophthalmometer shows that we have to deal with a high degree of astigmia, we properly dispense with trials with the weaker cylinders, and in this way gain time, spare the patient fatigue, and greatly simplify the problem which his answers help us to solve. Much might be said on the value of the instrument as a time-saver ; but I prefer to call your attention to an advantage which has not, to my knowledge, been referred to by other writers.

This advantage is that the ophthalmometer enables us to proceed in the different parts of the subjective examination with logical precision and certainty, not so much by indicating the amount of astigmia as by pointing out the position of the meridian of least refraction.

In considering astigmia we should regard it as being an object of a certain length, which length it is our duty to discover. Now, in any of the arts when it becomes necessary to measure an object, the first thing is to determine the position of one end, and then to ascertain the distance to the other end, taking care that the object does not move during the process

of measurement. There is reason to fear that these steps are not always taken in the subjective examination of astigmia.

The object to be measured, the astigmia, is what I have called the "remote zone" of the range of accommodation. The farthest end of this zone is the *remotum* of the meridian of least refraction ; the nearest end is the *remotum* of the meridian of greatest refraction. The strength of the cylindrical glass required to bring the two *remota* together gives the measure of the astigmia.

Now, the method I have recommended for the subjective examination of astigmia consists of two steps ; first, by means of spherical glasses I shift the patient's range of accommodation, so as to bring the *remotum* of the meridian of least refraction to the test-cards at 5 metres (or a little nearer than the cards) ; and, secondly, by concave cylindrical lenses I carry back the *remotum* of the meridian of greatest refraction till it also rests on the test-cards.

It will be seen that by this method mydriatics are not required, for the fixity of the remote zone, which is commonly obtained by paralysis of accommodation, is here ensured in another way. The first step of my method fixes one end of the object to be measured, and prevents its moving in a way to mislead me ; for if at any subsequent moment during my trials the eye accommodates, the lines which remained distinct on the clock-dial will appear less distinct, and all the other lines will be blurred in proportion ; and, in fact, as if aware of this, the eye makes no efforts of accommodation. The lines remain unequal in distinctness until we add the cylindrical glass which corrects the astigmia.

In myopic astigmia it is the common practice of observers to proceed on a plan closely resembling the one I have just outlined. They agree that the determi-

nation of myopic astigmia is simple. They first correct the meridian of least refraction and then by means of concave cylinders correct the meridian of greatest refraction. Now, if they did this in cases of hypermetropic and mixed astigmia, they would not have come to believe that such cases are especially difficult. Instead, however, of following such a plan in cases combined with hypermetropia, they take no special pains to distinguish between the two principal meridians, and, not knowing with which they have to do, fail to prevent changes in accommodation which alter the relative value of the radiating lines of the clock-dial. The practical result of this, and of trying now convex and now concave cylinders, is simply to introduce artificial difficulties into the solution of the problem. By my method, however, the process is exactly the same for hypermetropic and mixed astigmia as for myopic astigmia.

This method which I have ventured to recommend in this and other communications[1] can, like all other subjective methods, be carried out without the aid of the ophthalmometer ; but that instrument can easily be made to render a special service in this connection.

The rules laid down in the preceding portion of this paper show that there are inferences to be drawn from the ophthalmometric reading before the patient has been examined in any other way ; but other and more important inferences can be made when the ophthalmometric reading is considered in connection with the answers given by the patient during the subjective examination. Perhaps the most important service rendered by the instrument is that it informs us of the position of the meridian of least refraction of the eye

[1] *Bulletin de la Soc. Française d'Ophtalmologie*, 1895, p. 399 ; OPH- THALMIC REVIEW, 1895, p. 275 ; *Archives d'Ophtalmologie*, 1896, p. 219.

and thereby enables us to interpret the answers of the patient in a highly practical way.

The very first statement of the patient in reply to our question as to the relative value of the different radiating lines on the clock-dial often enables us, with the help of the information given by the ophthalmo- meter, to state with certainty that the case is one of astigmia combined with a considerable degree of hypermetropia. In fact, it may be said that the use of the ophthalmometer in connection with my special method of subjective examination makes hyperopic and mixed astigmia often easier of diagnosis than simple myopic astigmia. As this point has not, so far as I know, been made by any writer, and as it shows in a striking manner the practical value of the ophthal- mometer, I may speak of it more in detail.

To make my meaning plain, I may relate a case. Examination of the left eye of Mrs. T. P. H. with the instrument shows a direct astigmia of 3 D. (o $\pm$ 3). The first inference is that the subjective examination will show a direct astigmia of about 2 D. In other words, we infer with certainty that the horizontal meridian of the eye is the meridian of least refraction, and that the patient looking at the clock-dial placed in the remote parts of her range of accommodation will see the *vertical* lines more distinctly than any other. If then, this patient looking without the aid of glasses, tells me that the horizontal lines (and not the vertical) are the most distinct in the clock-dial at a distance of 6 metres, I infer that that distance is not in the remote part of her range of accommodation ; or, in other words, that the patient has a considerable degree of hypermetropia.

The diagnosis of hypermetropia might no doubt be made in many such cases from the observation of a high degree of visual acuity without glasses ; but the patient's first answer as to the clock-dial in the case

mentioned makes the presence of hypermetropia absolutely certain. Moreover, the ophthalmometer here enables me to proceed to the discovery of the correcting glass by rapid steps, passing over the weaker glasses which would only tire the patient uselessly.

I begin the examination, therefore, with 2 sph. With this glass she still sees the horizontal lines more distinctly than the vertical. I therefore use 4 sph. ; vision is much improved thereby, and the lines of the clock seem to be all alike. Still guided by the inference drawn from the ophthalmometer, I give 6 sph., and now, as had been foreseen, the vertical line is distinctly black and the horizontal indistinct. The clock-dial, in a word, is now in the remote zone. I now correct the refraction exactly for the vertical line, and then, leaving the convex spherical glass in the trial frame, add concave cylinders, beginning with 1·25, till I make the horizontal line as distinct as the vertical. It is clear that the ophthalmometric reading has helped me throughout the examination, enabling me to proceed with logical precision and certainty, instead of groping in the dark. Cases of this kind are not exceptional, but are constantly met with in our daily practice.

Javal and Schiötz have rendered an immense service to practical ophthalmology by perfecting the work of Helmholtz. The value of their instrument has already made itself felt in all countries where ophthalmology is practised, but the field of its usefulness has yet to be thoroughly understood and appreciated. It has already contributed much to our knowledge of what astigmia really is ; and when time has allowed us to follow our patients through a longer series of years, we may hope to learn, with the aid of this instrument, something of the influences which bring about changes in the corneal curvature.

In the meantime the ophthalmometer, used in the way indicated, acts as a guide and as a check in the

search for the correcting glass ; and subjective opto-
metry, no longer a wearisome and blind proceeding
subject to error, is made a rational method as exact
and interesting as any employed in physical diagnosis.

**PH. PANAS (Paris). The Rôle of Auto–Infection
in Diseases of the Eye.** *Archives d'Ophtalmologie*,
May, 1897, *p*. 273.

Under this title the author passes in review the various
disorders of the eye and its surroundings which, in the
light of advanced pathology, appear to be caused by
infective matter carried thither by the circulation. The
infective material is of many different kinds. In one group
of cases it comes from sources external to the body, in
another it is formed within the body. The former group
includes various germs and toxines, some of which are
already known ; while others, such as the virus of syphilis,
variola, vaccinia, rabes, malaria, scarlatina, rubeola, &c.,
are still undefined. It includes also many kinds of poisons.
The latter group includes the waste products which accu-
mulate in the blood through faulty elimination on the part
of various organs, *e.g.*, uterus, kidney, liver, intestine, skin,
and lung, and the toxic substances which are produced by
disordered action in various glands. The possible sources
of such disorders, therefore, are very numerous, and the
field of enquiry is large and highly important.

But in an infective disorder the infecting material is not
the only factor. A second, of hardly less importance, is
the condition of the tissues to which the poison is conveyed.
We must look to the soil as well as to the seed. The
arthritic and lymphatic diatheses, and the conditions
attending precocious growth, alcoholism, injury, &c.,

render the tissues unduly prone to infection, and they do so specially by disturbing the action of the nervous system.

The influence, in this respect, of altered innervation has been demonstrated by experiments on animals. For example, the nerves to one kidney having been divided at the hilum, an injection of staphylococcus or streptococcus is made beneath the skin ; double nephritis ensues ; while in animals similarly injected but not enervated, no change occurs in the kidneys. Again, one pneumogastric nerve is divided and tuberculous matter is injected ; tuberculosis of both lungs, most pronounced on the side of the section, results. In like manner compression, irritation, or paralysis of a nerve or nerve centre lessens, in the parts to which the nerve is distributed, the power of resisting infective invasion.

The bilateral symmetry which infective disorders so frequently present may be explained as follows :—Lesion of an organ on one side of the body leads by reflex nerve action to disturbance of innervation and nutrition in the corresponding organ of the other side. Any toxic substance which may happen to be present in the blood will tend to locate its action bilaterally in this zone of diminished resistance. The infective material is an essential factor, but the symmetry of the disorder which it excites depends on the distribution of the nervous system.

Pathological changes in and around the eye may arise, therefore, from very many varieties of infection, and the possible sources of such infection must be carefully sought for in all parts of the body. Moreover, the bilateral occurrence of a disorder frequently points to an infective origin even though the source of the infection remain undiscoverable.

Metastatic Ophthalmitis.—The possible sources of pyæmic infection of the eye are numerous. Among the most important is the genital tract, especially in cases of puerperal infection. According to Axenfeld the metastasis almost always occurs during the first two weeks of the puerperal condition; it usually leads to suppurative ophthalmitis with perforation and shrinking of the eye ; the unilateral is

more common than the bilateral form in the proportion of two to one ; the former does not preclude recovery, but the latter almost always ends in death. The ophthalmitis depends on the entrance into the eye from the blood of microbes—streptococcus and staphylococcus, chiefly the former. The infective process is of embolic character and appears to begin sometimes in the choroid, sometimes in the retina, the former chiefly in unilateral cases, the latter in the bilateral. In view of the uncertainty as to the exact localisation, the term metastatic ophthalmitis is preferable to metastatic choroiditis or retinitis. Similar metastatic mischief in the eye occurs in diseases of the genital tract other than puerperal, *e.g.*, in suppurative conditions of the ovaries, tubes, uterus, and vagina. It also occurs in con- nection with surgical pyæmia resulting from injuries and operations. In other cases again the source of the infective material may be undiscoverable.

Milder Forms of Metastatic Ophthalmitis occur in connection with various infective disorders, such as influenza, cerebro- spinal meningitis, typhus, and more rarely variola and erysipelas. The eye affection occurs as a retino-hyalitis, often accompanied by retinal hæmorrhages, and leads, without much reaction or pain, to detachment of the retina and atrophy of the globe. Whether these milder forms depend on attenuated microbes or on toxines derived from them is an open question. The fact that in some cases no microbes have been found either in the eye or in the blood when looked for at a later period, does not prove that they were absent at the time when the destructive changes occurred. Positive evidence of the presence of the pneumococcus has been obtained in some cases. Some observers regard metastatic purulent ophthalmitis and septic retinitis as the same process in different degrees of virulence ; others hold them to be distinct affections, the first due to microbic invasion, the second to chemical changes in the blood such as are present in leukæmia, albuminuria, and pernicious anæmia.

Iritis, *choroiditis*, *retinitis*, *and retinal hæmorrhage*, of the kinds which are usually attributed to a morbid diathesis,

probably owe their outbreak, in some cases, to the super-vention of microbic infection. Many of these patients are found on enquiry to be suffering from persistent dyspepsia, constipation, chlorosis, dysmenorrhœa, leucorrhœa, or other conditions which lead to the retention of organic toxines in the blood. In others a morbid condition, perhaps of long persistence, may be traced to an attack of eruptive fever, malaria or dysentery. It is possible that some cases of albuminuric, diabetic, and leukæmic retinitis are due to the association of the systemic disease in question with the added effect of microbic toxines. We know that certain substances, such as naphthaline and menthol, tend specially to set up changes in the retina, while others, such as tobacco, bisulphide of carbon, &c., attack by preference the optic nerve and brain. It is not unreasonable to sup-pose that different toxines have similar selective affinities.

Interstitial keratitis, as distinguished from those forms which attack the surface of the cornea, and arise from direct infection from without, is, speaking generally, due to a systemic disorder. In a large number of cases, but not in all, it is a result of hereditary syphilis. Among other causes are tuberculosis, chronic rheumatism, gout, malaria, diabetes, and influenza. The beneficial result of mercury in a given case is no sufficient proof that syphilis is the cause. The corneal change is not a primary keratitis but is secondary to changes in the ciliary portion of the uveal tract. Leprosy, now known to depend upon a specific bacillus, tends, like tubercle, to locate its invasion of the eye chiefly in the ciliary body and iris, and thence invades the margin of the cornea.

Metastatic conjunctivitis, *&c.*—A common source of auto-infection of the eye through the medium of the blood is gonorrhœa of the genitals. The conjunctivitis which arises in this way is to be distinguished from that caused by direct contact with gonorrhœal pus. The discharge is rather mucous than purulent, the chemosis is less severe, complications on the part of the cornea are less frequent, the whole course is milder. The eye infection alternates with invasion of the joints or tendons. The same poison

is a well known cause of iritis, peripheral neuritis, some-
times of the optic nerve, tenonitis of the eyeball, and
adenitis of the lacrymal gland. Apart from gonorrhœa in
its ordinary form, an extension of the disease towards the
bladder, ureters, kidneys, uterus, tubes and ovaries, may
be the origin of similar infective mischief in the eye.

The naso-pharynx and the adjacent cavities and sinuses
are a common source of infectious disorders of the eye ; in
this respect ozæna plays an important part. There are
forms of iritis and choroido-retinitis for which no constitu-
tional cause can be found, and which do not improve until
a chronic inflammation of the mucous membrane of the
naso-pharynx is corrected. Toxines from this source,
travelling by the lymphatics and blood vessels, invade
adjacent cavities, set up orbital cellulitis, periostitis, and
sometimes meningitis, and may infect and destroy the eye.
In a remarkable case recorded by Panas, a double exoph-
thalmia with papillitis and amblyopia was attributed, in
the absence of other discoverable cause, to an ozæna with
polypoid formations in the nose, and was completely cured
by a course of arsenic. In such cases it is a mistake, in
the absence of evidence, to assume a syphilitic cause, and
it must be remembered that mercury and iodide of potas-
sium cure other things besides syphilis. Damage of the
optic nerve from nasal disease occurs in more ways than
one. Usually an infective inflammation of one of the
sinuses leads to inflammation and atrophy of the nerve.
Sometimes the meninges are invaded and the nerve suffers
later. Disease of the maxillary sinus may lead to
phlegmon and periostitis of the orbit and even to suppura-
tive meningitis. Again, a rhinitis may extend through the
cribriform plate of the ethmoid and thus lead to a circum-
scribed meningitis with compression of the optic nerve and
chiasma. Some forms of blindness which present at first
no visible changes at the disc, have their origin in disease
in one or other of these adjacent cavities. Again, suppura-
tion of the middle ear sometimes leads, through the lateral
sinus, the cavernous sinus, and the ophthalmic vein, to
mischief in the orbit. Furunculus of the face and especially

of the lips has been known to lead to phlebitis in the orbit. In all these cases there is probably a metastasis of toxic material derived from microbes.

Sympathetic Ophthalmia.—In spite of all that has been done to elucidate it, the nature of this morbid process is still an open question. The theory of Deutschmann, which regards it as a migration of septic material from the one eye to the other, has not gained ground of late. The evidence in its favour (see abstract of paper by Schirmer, OPHTHALMIC REVIEW, 1892, p. 83) is by no means conclusive, and is opposed by the negative results which have almost uniformly followed the attempt to excite sympathetic ophthalmitis artificially in animals. On the other hand the theory of reflex nerve-action does not afford a sufficient explanation of an inflammation which has the character of a destructive septic process. The theory proposed by Panas may be stated as follows : Injury of one eye, especially when it involves microbic infection and severe irritation, is capable of disturbing the nutrition of the fellow eye by reflex nerve-action. Important evidence of such disturbance is furnished by certain experiments by Bach (OPHTHALMIC REVIEW, 1896, p. 289). By such reflex action the resistance of the second eye to the invasion of microbes or toxines, should any such happen to be present in the system, is lowered. Sympathetic irritation of the second eye then is the expression of reflex nerve-action, while sympathetic inflammation, when it occurs, denotes the invasion of the weakened organ by infective material conveyed to it by the circulation of the blood.

That injury is usually a prime factor in the process is undeniable, but that a supplementary factor is needed appears from the fact that of a large number of severe injuries of the eye only a very small proportion lead to sympathetic ophthalmia. Again it has been proved by experiments on animals that an eye previously weakened by local aseptic irritation affords ready entrance to an invasion by microbes injected at a distant part of the body, while such injection takes no effect if the eye be in its

normal condition. Further, it is a matter of clinical experience, as Mackenzie clearly pointed out, that those who suffer from sympathetic ophthalmia frequently present an unhealthy constitutional condition, *e.g.*, obstinate constipation, disturbance of kidneys, liver, &c., alcoholism, febrile conditions past or present, nasal or pharyngeal disorders, or other conditions leading to the retention of toxic substances in the blood. The varying proneness of different individuals to exhibit reflex disturbance in the nervous system has also to be taken into account. If this view of the matter be the true one, the danger of sympathetic ophthalmia in any given case will depend, firstly, upon the extent to which the fellow eye shall become weakened by nerve-reflex, and secondly upon the presence or absence of toxic substances in the circulating fluids. And further, it is clear that a rational treatment of such cases will include, not only the careful aseptic treatment of the injured eye, and the protection of the fellow eye from all avoidable irritation, but also the removal from the system as far as possible of all toxic impurities.

The paper which we have here attempted to condense is obviously of great interest and value, and the importance of these suggestions with regard to the nature of sympathetic ophthalmia can hardly be over-rated.

P. S.

GREEFF, R. Interstitial Keratitis in Relation to General Diseases. *Sammlung Zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde.* 1897.

This is one of a series of pamphlets on special subjects written with a view to the needs of the general practitioner, and naturally contains a good deal of matter which it would be of little interest to recapitulate here. Passing over the remarks contained in the earlier pages on the diagnosis of corneal affections in general, and the description of interstitial keratitis in its typical form, we note that the author describes two aberrant varieties of the disease. In the *keratitis centralis annularis* of Vossius the deposit instead of producing a general cloudiness takes the form of a ring concentric with the cornea, composed of small confluent grey areas; the superficial epithelium is as usual cloudy and stippled. Gradually the periphery clears while the opacity advances towards the centre, so that the ring becomes smaller, assumes the form of a small central opacity and finally disappears. In rare cases more than one concentric ring is observed. Not uncommonly while one eye presents the ring form the other shows the ordinary diffuse opacity. In *keratitis punctata profunda* again the opacity is not diffuse but appears as a larger or smaller number of deep punctiform infiltrations which do not run together. These dots are to be distinguished on the one hand from deposits on Descemet's membrane (which, however, occasionally accompany them) and on the other from the keratitis punctata superficialis of Fuchs. The affection is almost invariably due to *acquired* syphilis, and has been called keratitis punctata syphilitica by Mauthner, Hock, Purtcher and others.

In discussing the *age-incidence* of the disease the author points out that it is important to remember that an interstitial keratitis having many of the characters of the Hutchinsonian affection may arise *in utero*, and is probably the cause of most of the congenital opacities of the cornea which have their seat in its deeper layers. There had been a tendency to regard such opacities (in accordance

with v. Ammon's views) as invariably due to a delay in the process of development, whereby from the third month onwards the cornea gradually differentiates itself from the opaque sclerotic, until Laurence, describing a case of " corneitis interstitialis in utero," directed the attention of ophthalmologists to the part played by intra-uterine inflammatory conditions in this matter. Several similar cases have since been described. The author had the opportunity of observing the following clinical sequence : the parents presented no evidence of disease at the time of examination beyond a certain amount of anæmia and debility in the mother, and syphilitic infection was denied ; there had been eight pregnancies in twelve years ; the first three had resulted in full-time, healthy, female children, in whom there had been no eye-affection at birth or subsequently ; then came a miscarriage at the fourth month ; then a child (male), born in the ninth month, which lived for twenty-four hours ; then three children (male), born at full-time. All four children born after the miscarriage came into the world with " white eyes " ; and the two which were still surviving presented glandular enlargements, snuffles and scars on the upper lip. The eyes were of full size and seemed fully developed, but the corneæ were uniformly opaque, of a bluish-white colour, with a smooth surface ; there was no trace of vascularisation.

In describing the *course* of the disease the author says that judging from his own observation second attacks are by no means uncommon. V. Hippel's experience bears this out, for among sixteen cases which he was able to follow for a long series of years there were five recurrences ($=$ 31 per cent.) ; and the reason that they appear less frequent as a rule is that it is difficult to follow the case for a sufficient length of time ; the second attack has sometimes followed the first after an interval of nine or ten years.

The following passage summarises the author's views on the somewhat burning question of the *ætiology* of the affection. " The most various infectious diseases, nutritional derangements, &c., may cause an interstitial keratitis.

Among such causes by far the most frequent is hereditary syphilis ; then comes tuberculosis, acquired syphilis, influenza, malaria, diabetes, &c. As Bosse rightly observes, it is not that hereditary syphilis, or scrofula, or rheumatism has each its special property of evoking a specific keratitis, but rather that we have to do with a single disease for which there are many different causes ; that is, the affection must be regarded as the result of some particular anomaly of the general metabolism which may be induced by many different diseased conditions. Among these diseased conditions hereditary syphilis holds an altogether predominant position. For some years I have interested myself in the ætiology of interstitial keratitis, and I have come to the conclusion that of the typical, acute, bilateral cases the vast majority owe their origin to hereditary syphilis. The more one makes it a habit to investigate the cases *completely* the more often one will discover this causation. Nevertheless the rule is not without its exceptions, and there are few observers now-a-days who hold the view, which had for some time a wide acceptance, that interstitial keratitis is *exclusively* related to hereditary syphilis."

The author gives a fairly complete description of the signs to be relied on in making the diagnosis of hereditary syphilis, laying especial stress on the " Hutchinsonian triad " of notched teeth, nerve deafness and keratitis. We think, however, that he is scarcely correct in attributing to Hutchinson so sweeping a statement as that the characteristic teeth are *always* present with hereditary syphilis ; and when further taking exception to Hutchinson's opinion that when present they are pathognomonic of syphilis it would seem worth while to have given a fuller statement of the facts than the simple assertion that " in rare cases " they are present in non-syphilitic patients. Among the stigmata of the disease which the author describes is one which has not received much attention in this country, that is, a " smooth atrophy of the base of the tongue," which was pointed out by Virchow as pathognomonic of hereditary syphilis. It appears to be due to destruction of the follicular glands at the back of the tongue, gives

rise to no subjective symptoms, and is best determined by palpation with the fore-finger. It has been recently found to be present in twenty-six out of fifty cases of interstitial keratitis at the Berlin University Eye *clinique*.

Passing on to *constitutional conditions other than syphilis* which are associated with interstitial keratitis, it is curious to note how the old, somewhat loose doctrine of a *scrofulous keratitis* has been revived in a more definite form by recent observers. Much diversity of opinion, however, still exists as to the frequency with which tuberculosis is to be reckoned as the essential causative agent, the difficulty being increased by the fact that in some cases syphilis and tubercle may both be present, for the depression of vitality induced by inherited syphilis directly predisposes to the development of tubercle. Dr. Greeff himself considers that cases of interstitial keratitis of tubercular origin are not of great rarity; he thinks, moreover, that such cases differ somewhat in their clinical course from those due to syphilis, setting in gradually, often remaining limited to one eye and clearing very slowly, and perhaps imperfectly. At the same time he warns the reader against inferring that lingering, atypical cases are to be put down to tubercle for that reason alone.

The author would place *acquired syphilis* after tuberculosis as the next most frequent cause of interstitial keratitis, and as one might expect, the acquired syphilis of early infancy is that which is most frequently followed by keratitis; such cases are often not distinguished from the ordinary congenital ones. The peculiar form of keratitis occasionally seen in acquired syphilis (keratitis punctata profunda) has been already mentioned.

There still remains a certain number of cases in which syphilis and tuberculosis can both be excluded as exciting agents, and some other constitutional affection must be sought for. It would be remarkable if we did not find *rheumatism* (with which may be included "*chill*") as the incriminated malady in some of these cases, and the author points out that several observers (Leber, Parinaud, Knies, v. Hippel) have described cases in which they

considered that the two conditions were associated as cause and effect ; and he has himself observed some elderly persons in whom, apparently in connection with a rheumatic affection, there developed an interstitial keratitis ; " there was at least no other demonstrable cause for it." These cases were usually mild in character.

That *malaria* is in some instances the cause of an interstitial keratitis, he considers indubitable ; the patients who develop it are usually those who, after long residence in malarial districts in the south, have returned to more northerly climates. Rarer still are cases due to *diabetes, influenza* and *diseases of the female generative organs*. The influence of menstruation on eye-affections in general is well known, and has often been noted in connection with the disease in question, the pathological suppression of the function acting, as a rule, injuriously, its establishment often strikingly ameliorating the condition.

Recently Pflüger has described a case in which, in a man of 22, with extensive lichen ruber planus and psoriasis vulgaris, first a herpes corneæ, and subsequently bilateral keratitis interstitialis developed ; and another case, in which it occurred in a man of 57, who suffered from psoriasis. Michel has described a case in connection with erythema exsudativum, and Stern one with urticaria hæmorrhagica.

Finally, we meet with certain cases in which no accompanying disease or diathesis can be discovered ; most of these, though not all, occur in pale, weakly young persons, in whom some defect of general nutrition may be assumed.

It is interesting to note that interstitial keratitis may occur in *animals*, which are insusceptible to syphilis ; it has been observed in horses, dogs, bears and goats. The two latter observations are especially remarkable, as in these cases it occurred in an epidemic form. In the case of the bears observed by Wagenmann, at Sofia, no other lesions were discovered in the animals *post mortem*, and the cause of the affection remained obscure. The corneal changes greatly resembled those found in man, and there were accompanying lesions of the anterior part of the uveal

tract. Pflüger observed an interstitial keratitis in connection with an outbreak of " agalactia infectiosa," in a herd of goats; of twenty - four affected animals eleven developed the corneal lesion, generally bilaterally. The disease is described as " a mycotic rheumatic fever ; " it begins with clotting of the milk in the udder and rapid suppression of the secretion : then follows diffuse keratitis and at the same time, or a week or two later, the joints are affected.

With regard to *treatment* the author quotes v. Graefe : " The influence of treatment in diffuse keratitis is very slight ; we may to some extent direct its course, may ward off certain complications, but we cannot cut short its steady onward progress. The opacity of the cornea, which often reduces the patient's vision to the quantitative perception of light, will ultimately disappear without a trace. For this result, especially if the affection was a bilateral one, a grateful public will credit the medical man with a remarkable cure ; but it was merely the outcome of the natural course of the disease, which he was powerless to curb." And his own view appears to be that the keratitis, with its resulting opacity, is not in any way influenced in its development, density, or duration by any therapeutic measures. Treatment is called for, however, to combat the complications on the side of the uveal tract, which are rarely absent in cases of any severity ; and further for the condition of the general health of which the keratitis is the outward indication ; it divides itself therefore into *local* and *constitutional*. The former consists in keeping the pupil dilated with atropine, and the use of warm compresses or frequent warm bathing of the eyes during the active inflammatory stages, with moderate, not excessive, protection of the eyes from light ; and for the residual opacities after the acute stage has subsided, massage with a mercurial or iodide of potash ointment (10 to 20 per cent. of the yellow oxide of mercury, or 10 per cent. of iodide of potash), the massage to be done by rubbing the cornea strongly with the finger through the closed lids twice a day for five to ten minutes, a drop of cocaine solu-

tion being previously instilled if the patient is sensitive. Operative measures, such as peritomy, paracentesis or cauterisation, the author considers of very doubtful benefit. With regard to sub-conjunctival injections, whether of salt or sublimate solution, so far as he has seen them used at the Berlin *clinique*, a good result followed in those cases in which a good result was to have been anticipated in any case, while in those in which other methods had failed, the effect of the injections was absolutely *nil*.

In the constitutional treatment, in the first place, and in general, no means are to be neglected which may improve the condition of the patient's general health ; such as good food, change of air, iodide of iron, cod liver oil, &c. ; secondly, where syphilis is present, the special indications are threefold, viz., mercury, sweating, and iodide of potash. The mercurial treatment may be carried out, with due precaution, in all syphilitic cases, unless the patient is in a very weakly condition, when it is better postponed until the health has been to some extent restored by other means. The author gives a decided preference to the inunction method, the experience of the Berlin *clinique* being that it is followed by fewer relapses than that of subcutaneous injections of mercury. For adults 3 grammes of unguentum cinereum are rubbed in daily, the inunction being omitted every seventh day and a bath taken. On the whole about 150 grammes are used for each case. The same treatment, with suitably modified dose, may be used for children of a year old, and the author quotes Hochsinger's investigations as a proof of the value of this course as a preventive measure. Hochsinger treated sixty-three infants, in whom a syphilitic inheritance was certain, with mercury, and was able to follow them afterwards for periods of from four to twenty-two years ; in not a single case did he see Hutchinsonian teeth, or interstitial keratitis, or deafness develop.

In severe cases, and particularly in those in which serious iritic complications arise, the mercurial course should be supplemented by a " schwitzkur." The patient takes 2

grammes of salicylate of soda dissolved in a glass of water in two portions, with a quarter of an hour's interval, then goes to bed and wraps himself in blankets for two hours, during which time he sweats freely ; this procedure may be employed every second or third day, alternately with the mercurial inunctions, up to about twenty times.

As a sequel to the mercurial treatment the author considers that it is distinctly advantageous to give the patient a course of iodide of potash ; 2 grammes of the salt are given per day, until he has taken 100 to 150 grammes.

W. G. LAWS.

V. MORAX (Paris). Note on a Pathogenic Diplo-bacillus affecting the Human Conjunctiva. *Annales de L'Institut Pasteur, June,* 1896.

V. MORAX (Paris). Sub-acute Conjunctivitis : a Clinical and Bacteriological Study. *Annales d'Oculistique, January,* 1897.

TH. AXENFELD (Breslau). Chronic Diplo-bacillus Conjunctivitis. *Centr. f. Bakter. Parasitenkunde und Infektions Krankh., Band xxi.,* 1897, No 1.

The conjunctival affection described by Morax and Axenfeld adds to the comparatively small list of eye diseases of microbic origin, in which there seems little doubt that the micro-organism has been identified.

The clinical features of this form of conjunctivitis are very similarly described by both writers ; they do not differ materially from those of mild catarrhal conjunctivitis. The symptoms come on without apparent cause ; both eyes are affected but not always simultaneously and not always equally ; in the eye first attacked the inflammation is usually more severe. There are slight photophobia

and lacrymation ; the lid margins, especially near the canthi, become red, but there is no tendency to glandular disturbance ; there is, particularly at night, yellowish rather tenacious secretion. The palpebral conjunctiva shows very little swelling, but considerable hyperæmia. The ocular conjunctiva is involved, if at all, only in its peripheral part. No complications have been observed, except the development of a phlyctenule (containing bacilli) in one case, and there seems no tendency for an extension of the inflammation to adjoining mucous membranes. The disease is essentially chronic and shows very little spontaneous tendency to recovery ; the symptoms may remain practically unaltered for weeks, if no treatment is adopted.

All Axenfeld's cases except one occurred in adults ; the exception was a boy of 10.

There appears to be no season of the year during which the disease is especially common. Between April 1 and October 31, out of a total of 1,453 new cases in Parinaud's *clinique*, Morax found sixty-one instances of this affection. During the same period and among the same patients he found 125 cases of acute conjunctivitis due to Weeks' bacillus. The clinical features of this affection are not sufficiently characteristic to enable a positive diagnosis to be made ; bacteriological examination is necessary.

The micro-organism (shown in plates by both writers) is most frequently found as a diplo-bacillus, but in addition to the pairs, chains are not uncommon. It resembles somewhat the pneumo-bacillus of Friedländer, but the bacillary form is more decided and there is no trace of a capsule. The bacilli are generally free in the secretion, but they may be found within phogocystes ; they are often abundant in the desquamated surface cells of the conjunctiva. They are stained easily and uniformly by the basic aniline dyes, and are completely decolourised by Gram's method.

Cultures of this micro-organism are readily obtained ; it thrives at a temperature of 30° to 37° C., but grows with certainty only in a medium containing animal serum.

Axenfeld's best results in cultivation were obtained with bouillon to which one-third human serum had been added. Morax also recommends this as a culture medium. The bacillus is ærobic, and requires an alkaline soil; an acid medium kills it, and even on neutral material the growth is feeble.

Examination of a culture twenty-four hours old shows diplo-bacilli identical with those found in the conjunctiva; they are immobile and colour uniformly; diverse involution forms are not uncommon at a later period. In a few weeks the bacilli are entirely degenerate. In human serum, however, the bacillary form is retained longer than in other animal serum.

This bacillus is non-pathogenic to the monkey, dog, rabbit, guinea-pig and pigeon, either in subcutaneous injection or as a local application to the conjunctiva.

Morax had no difficulty in inoculating the human conjunctiva from a bouillon serum culture; the disease had all the clinical features of cases met with in the *clinique*, and the diplo-bacillus was found in the conjunctival secretion five days later.

Axenfeld failed to produce the disease in man from a culture on ox-serum; but from a pure culture on Lœffler serum he inoculated two of his medical colleagues, who, four days later, presented all the appearances of the disease. In one, as in Morax's case, the affection spread to the second eye.

The treatment of this form of cunjunctivitis is very simple. The application of a weak solution of sulphate of zinc or perchloride of mercury has been found by both writers to produce a speedy cure.

J. B. L.

SHARKEY (London). The Representation of the
Function of Vision in the Cerebral Cortex of
Man. *The Lancet, May* 22, 1897.

Sharkey publishes records, clinical and pathological, of
three cases, all of which are of unusual interest, and
valuable adjuncts to our knowledge of the centres of vision
in man.

The first case was one of congenital spastic hemiplegia,
and the brain presented the following striking peculiarities:
(1) general arrest of development of the left hemisphere ;
(2) small size of the corresponding crus cerebri and anterior
pyramid ; (3) absence of the angular gyrus and superior
temporo-sphenoidal convolution, together with fusion of
some of the other convolutions of the left temporo-
sphenoidal lobe ; (4) small size of the optic tract, optic
thalamus and corpora geniculata on the same side.

The second case was one of embolism of the right
middle cerebral artery producing left hemiplegia and hemi-
anæsthesia ; absorption of a large portion of the right
hemisphere ; death seven years later.

Post-mortem. Sharkey found that the following convolu-
tions had been destroyed on the right side : the inferior
frontal, the external portion of the orbital, the lower half
of the two central convolutions, the inferior parietal
lobule, the angular gyrus, the convolutions of the island of
Reil, the superior and middle temporo-sphenoidal and part
of the inferior occipito-temporal convolutions.

The third case was one of right hemiplegia with rigidity.
Post-mortem. There was bilateral softening and atrophy
involving the brain in the region of the sylvian fissure, but
unequally on the two sides. The left side was most exten-
sively involved ; the ascending frontal and ascending
parietal convolutions, the inferior parietal lobule, the
angular gyrus and the greater part of the temporo-
sphenoidal lobe were extremely atrophied. On the right
side, the inferior parietal lobule, the angular gyrus, the
superior temporo-sphenoidal and the neighbouring parts of

the middle temporo-sphenoidal convolutions were much atrophied, discoloured and degenerate. The left crus cerebri was smaller than the right. On both the right and left side the occipital lobe was intact.

In the first case nothing is known as to the state of vision ; in the second, there was dimness of vision in the left eye amounting almost to complete blindness, and almost complete loss of hearing on the left side. Six and a half weeks after the attack sight and hearing were fully restored. In the third case there was permanent complete loss of sight and hearing.

Sharkey's remarks upon these cases are as follows :—

These three cases supply important evidence, each in its own way, of the relation of the region of the angular gyrus to vision. The first, though very suggestive, is lacking on the physiological side. In the other two cases we have both the anatomical appearances and the physiological changes which accompanied them, and I think they deserve the title of striking cases. But they have the defects which almost all such cases must have ; anatomically it is difficult to state the precise limitations of disease ; and physiologically we would like to have some further details. But it must, I fear, generally be so with our observations on man. In experiments on animals, however, even if the difficulties of correctly estimating physiological changes be surmounted, which are more than ordinarily great in ex- periments relating to the functions of the brain, and if the exact limit of the injuries inflicted can be determined, there still remains the fact that the knowledge gained of cerebral physiology in animals cannot be directly transferred to man. It serves as a beacon to guide our observations at the bedside and in the *post-mortem* room, but it still lacks that confirmation which alone can justify us in accepting it as a part of human physiology. Therefore, defective as the three cases may be, they appear to be worthy of forming links in the chain of evidence which finally leads to the solution of such questions. I suppose most clinical ob- servers will admit, as I do, that the occipital lobes are very intimately connected with vision, and are, in fact, " half

vision " centres. But it would be interesting to know whether they are inclined to limit the visual area in them to their internal or central aspect. To me it seems that the facts of disease do not warrant such a conclusion, but that hemianopsia results from destruction of the cortex on the external aspect as well. Hemianopsia is so persistent when once developed that it must be allowed that one occipital lobe cannot make amends for disease in the other, whereas one angular convolution can speedily enough make up for the temporary blindness produced by destruction of the other. How is it, then, that although each angular region seems to be able to subserve vision in both eyes it cannot make up for hemianopic defect produced by disease of the occipital lobe ? The only explanation I can see is that the occipital lobe is a lower centre through which visual impulses must pass on their way to the higher centres in the region of the angular gyrus, and that disease of the lower centre or of the fibres in connexion with it intercepts the visual impulses on their way to the higher centres. But each higher centre being connected with the whole of both occipital lower centres, destruction of one does not interfere permanently with vision in either eye.

Considering the important part which is played by mental vision in the higher intellectual processes in man it is not to be wondered at if he is found to possess high visual centres in an advanced state of development, although such centres may be non-existent or only rudimentary in animals below him in the scale of existence; indeed, clinical experience seems to show that mental blindness, and especially that variety of it which is called " verbal blindness," is associated with disease of the inferior parietal lobule which lies in front of the termination of the fissure of Sylvius. This convolution is continuous above and behind with the angular gyrus. The conclusion to which my cases seem to point is that the convolutions surrounding the posterior extremity of the fissure of Sylvius are specially concerned with the vision of the opposite eye, and in such a direct manner that destruction of them in one

hemisphere produces transitory blindness of the opposite eye, while bilateral destruction of them causes permanent blindness in both eyes.

J. B. L.

BARRETT (Melbourne). Tobacco Amblyopia in Horses. *Intercol. Med. Journal of Australasia, April* 20, 1897.

A form of blindness in horses, met with in some parts of Australia, has been supposed to be caused by the ingestion of the Australian tobacco plant (*Nicotiana suaveolens*). The evidence, however, is scarcely sufficient to make this a certainty. The disease is a slowly progressive one ; in the early stages loss of vision is noticed only when the light becomes dim, so that, although seeing fairly well in the day, the horses stumble and shy in the dusk. At night they are quite blind. At a later stage there is total loss of sight even in the brightest daylight ; no ophthalmoscopic changes have been found. Blindness is not the only nerve symptom observed in these animals. In several instances, paresis or paralysis of the hind legs has been noticed. No cases of recovery of sight either with or without treatment have been recorded.

Experiments made with a decoction of the plant mentioned, showed that the acute effects produced were identical with those of a decoction of ordinary tobacco, or by subcutaneous injection of nicotine. The symptoms varied in severity, from slight nausea and tremors when small doses were given, to complete paralysis and death after larger doses. The *post-mortem* appearances were in all particulars those observed in cases of poisoning by tobacco.

The pathology of the disease has been ascertained to be

atrophy of the optic nerves, and it is stated that in some cases the atrophy was apparent on naked eye examination of the nerves. Barrett gives a drawing of a transverse section of part of the nerve of a horse examined by him, which he thus describes: " The section of the nerve con- tained in all rather more than a hundred bundles of fibres, of which twenty are completely atrophied, that is to say, no axis cylinders are present. The remainder of the nerve bundles are affected in a varying degree ; in some bundles very few axis cylinders are visible, in others, few have been destroyed. The nuclei of the supporting tissue do not seem to be increased in number, nor is there any develop- ment of connective tissue. In the plate two of the com- pletely atrophied bundles are shown, the others are only partially affected. The appearances are those of a simple atrophy of the optic nerve, of non-inflammatory origin, such a condition as might readily be produced by the injec- tion of tobacco."

J. B. L.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

E. Nettleship, F.R.C.S., President, in the Chair.

Thursday, June 10, 1897.

Filaria Loa.—Dr. Argyll Robertson gave an account of Filaria Loa, in continuation of a description furnished by him two years previously, in the same patient, who had returned to Old Calabar and immediately suffered a return of her former symptoms. There were swellings in the arms and itching behind the eyes, as described by Miss Kingsley as almost universal in the Gaboon district. On one occasion at night the patient felt a bite in the flank, and forthwith extracted a portion of a worm. Movement

of a similar parasite was felt under the conjunctiva, and twice incisions were made in the knuckles in quest of one felt moving to and fro in the arm. Sandflies and mosquitos were sent home and examined by Dr. Robertson and Dr. Manson with a view to finding the intermediate form, but without success. Finally, the patient herself returned, invalided with dysentery and anæmia. Nausea and headache occurred while the parasites were moving about, associated with puffy swellings in the arms. All parts of the body were affected, but especially the scalp ; as recently as May 15, 1897, the parasite was perceived moving near the umbilicus, but could not be secured. The blood, excreta, saliva, and nasal mucus were carefully examined for embryos, but without success. Since the former account of this case was given two instances had been described on the continent, and two were at present under the treatment of Dr. Manson.

Sympathetic Ophthalmitis.—Mr. Richardson Cross read a paper on " Sympathetic Ophthalmitis," especially in connection with Mules's operation of evisceration. He cited several instances in which sympathetic irritation, or ophthalmitis, had followed the operation, the proportion being as high, he said, as 13 per cent. One patient in particular was under treatment of the most watchful and sustained kind for seven months before he happily recovered. In another a black mass at one corner of the stump was mistaken for melanotic sarcoma, but on closer examination proved to be an artificial vitreous of silver which had been inserted ten years previously. Many cases certainly appeared to do well for a time, but sooner or later trouble generally supervened.

Mr. Adams Frost referred to the fact that there was a committee at present considering the whole subject of sympathetic ophthalmitis. He thought unsuccessful cases —that is, cases in which sympathetic trouble followed— were often those in which delay had occurred between the original injury and the evisceration, giving time for infection to take place before the operation, or else those

17

in which a fistula persisted leaving the channels open for subsequent infection. He cited twelve cases of four years' standing, and others of eight and nine years, without any after-trouble ; in one there developed nystagmus in the sound eye after five years, and this was perfectly repre- sented in the artificial one.

Mr. Bickerton declared his experience in favour of Mules's operation, and referred to published and collected cases, which showed a percentage of 15 of sympathetic ophthalmitis after complete enucleation. (These, however, were shown to be picked and more than ordinarily severe cases collected from the point of view of sympathetic ophthalmitis, and not representing the true proportion of the disease following simple enucleation.) He cited a case in which, though the disturbance occurred, it subsided in about ten days, the eye recovering perfectly.

Mr. Snell questioned whether sympathetic ophthalmitis occurred as frequently as formerly. His experience led him to believe it did not, and he attributed the improvement to the greater care exercised. Though dealing with many cases of injury he enucleated fewer eyes. He thought the percentage of subsequent sympathetic change indicated in the paper a very high one.

Mr. Critchett, Dr. Argyll Robertson, and the President all spoke as to the rarity of sympathetic ophthalmitis after complete enucleation. The President said it was an important question in pathology whether the disease occurred in a less intense form after Mules's operation or not.

Mr. Treacher Collins inquired whether the stumps had been carefully examined after removal to see if evisceration had been complete. (Of this there was no record.)

Mr. Richardson Cross, in reply, said he was sure many cases occurred after Mules's operation even with the strictest antiseptic precautions and often after many years. He preferred enucleation.

Blindness following Blows on the Head.—Mr. S. Snell read this paper. Loss of vision was attributed to fracture

extending into the foramen rotundum, and was the result generally of injuries to the front of the cranium ; but Mr. Snell showed that a similar condition not infrequently resulted from injuries to any part, and cited several instances of blows on different parts of the skull, which led to immediate loss of vision in this way.

Mr. Bickerton spoke of the remote as well as the im- mediate effects of injury to the head in producing blind- ness, and referred to the interest connected with cycling accidents and insurance. He mentioned the case of one man who compounded with an insurance company for £50 as compensation for such an accident which later led to complete blindness.

Mr. Lindsay Johnson spoke of the effects of injury to the head in animals followed by blindness, and quoted instances in a crane, a leopard, a bear, and a kangaroo in which he had subsequently observed white atrophy of the disc.

Mr. Critchett mentioned an instance in which a heavy blow above the nose was followed by a reduction of vision to $\frac{20}{70}$, and subsequently to bare perception of light. The case was the subject of a lawsuit. In a case recorded at the time in " Holmes's System of Surgery " the opinion was expressed that loss of vision might follow late from such an injury.

The President discriminated between immediate and remote loss of vision in connection with head injuries ; of the first there could be no doubt, but the second was liable to great difference of opinion and interpretation.

The Degrees and Varieties of Colour Blindness.—Dr. Edridge Green read this paper. He said the colour blind may be divided into two distinct classes which are independent of each other. The first class includes those who are not able to see certain rays of the spectrum. The strongest objection to the use of a wool test only, is that a person may, through shortening of the spectrum, be unable to distinguish red from black and yet be able to pass the test with ease, as it is obvious that this will not prevent him

from matching a light green wool with other green wools. The second class of the colour blind make mistakes not because they cannot see any colour but because they are not able to perceive the difference between the colours which is perfectly evident to normal sighted persons. Both these classes are represented by analogous conditions in the perception of sounds. The first class of the colour blind are represented by those who are unable to hear very high or very low notes: that is to say, these notes are non-existent to them. The second class are represented by those who possess what is commonly called a defective musical ear. Normal sighted persons see six definite colours (points of difference) in the spectrum. The second class of the colour blind see five, four, three, or one, according to the degree of the defect, and they confuse the colours of the normal sighted which are included in one of their own.

The following cases were shown :—

Mr. J. R. Lunn : Bilateral Facial Palsy, Deafness, and Ulceration of the Corneæ.

Mr. Lunn and Mr. C. D. Marshall : Foreign Bodies embedded in the Orbit.

DIMINISHED SECRETION AS A FACTOR IN THE CAUSATION OF PRIMARY GLAU- COMA.

By Priestley Smith.

Professor of Ophthalmology, Mason University College, and Ophthalmic Surgeon, Queen's Hospital, Birmingham.

Among the various conditions which predispose to primary glaucoma, a shallow anterior chamber is generally recognised as one of the most important. We see, for example, a patient in whom glaucoma of congestive type has broken out in the one eye, while the other eye appears to be perfectly sound and free from disease in all respects except that it presents a very shallow chamber. We iridectomise the glaucomatous eye, and in the course of a day or two glaucoma breaks out in the other. In another case a drop of atropine used to such an eye induces a glaucomatous attack. The way in which the shallowness of the chamber predisposes to blockage of the filtration angle is well known, and need not be again discussed here, but what are the conditions which render the chamber abnormally shallow ?

Czermak has recently made a suggestion[1] on this point, which appears to be of considerable importance. He admits, with the present writer, that the increased size of the lens proper to advanced life explains to a certain extent the diminished depth of the chamber. He admits also the influence of subnormal dimensions

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[1] Reprint from *Prager Med. Wochenschrift*, 1897.

18

of the globe. But apart from these anatomical conditions, to which in some cases an abnormal slackness of the zonula may probably be added, he regards the shallowness of the chamber in the senile eye as a result of a diminished flow of fluid from the ciliary processes. That these secreting organs undergo degenerative changes in advanced life appears highly probable, indeed microscopic examination of senile eyes has revealed changes of various kinds in the connective tissue, the vessels, and the secreting cells, together in some cases with increase in the volume of the ciliary processes, and it can hardly be doubted that these changes are accompanied with alterations in the amount and constitution of the intraocular fluid. A diminution in the amount of the fluid secreted would presumably reveal itself by a diminished fulness of the aqueous chamber.

In support of this idea Czermak asserts that, in such a case as the one above suggested, the chamber is usually shallower in the predisposed but still healthy eye, than in the eye in which the outbreak has already occurred. Careful observation will, he declares, usually reveal this difference. The fact, if it is a fact, appears hitherto to have escaped observation. When the filtration angle becomes blocked, the anterior chamber, he says, fills up again to some extent and its depth is therefore somewhat greater after the glaucoma has set in than at the moment when it was merely imminent.

An obvious objection to this theory is that eyes which by reason of diminished secretion are becoming predisposed to glaucoma, should, previous to the actual occurrence of obstruction at the filtration angle, present a subnormal tension. Such subnormal tension has not, however, been observed. Whether in some cases it is actually present is a point deserving of care-

ful observation. Moreover it may be suggested that a gradual diminution of the inflow is accompanied by a gradual contraction of the channels of exit, which would prevent an excessive fall of tension. On the other hand, the well-known fact that, in many cases at any rate, the anterior chamber is re-established much more slowly after an operation for glaucoma than after a similar operation in a non-glaucomatous eye, favours the idea that degenerative changes in the secreting organs play a frequent part in the glaucoma process. The extreme slowness with which a mass of extravasated blood is removed from the chamber in some cases of operation for advanced glaucoma is further evidence of the comparatively stagnant condition of the fluid. It seems to me, moreover, that the gradual deterioration without return of tension, which is sometimes witnessed in eyes which have been iridectomised with complete success for acute glaucoma, points, in all probability, to a slowly progressive degeneration of the secreting organs. I have elsewhere published[1] the case of a man, who, twenty years before he came under my notice, was successfully iridectomised in both eyes for acute glaucoma. The one eye, though it never again became glaucomatous and retained some useful vision for many years, was ultimately lost by a kind of sclerosing keratitis with abolition of the anterior chamber. The other eye, which at the time when I published the case still retained excellent vision, so that the man could do some work as a clock-maker, has, during the last few years, gradually deteriorated in the same way.

That a condition which is essentially the expression of an excess of pressure, *i.e.*, an excess of fluid, in the

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[1] "Pathology and Treatment of Glaucoma." Churchill, 1891, p. 120, fig. 64, &c.

eye, should under any circumstances be induced by a diminution in the amount of fluid secreted, is at first sight paradoxical, but may perhaps prove true nevertheless. The object of this note is merely to draw attention to Professor Czermak's suggestion.

ON THE EMPLOYMENT OF ELECTROLYSIS AS A MEANS OF TREATING GRANULAR LIDS.

By SIMEON SNELL, F.R.C.S.Edin.

OPHTHALMIC SURGEON TO THE ROYAL INFIRMARY, SHEFFIELD.

THE modes of treatment suggested at one time or another for granular lids have been numberless, and some apology may be deemed necessary for introducing yet another to this list. My only excuse is that experience suggests that it may find a place in certain cases as an alternative to other methods.

I have now employed electrolysis in the treatment of trachoma in something more than a dozen cases. Usually speaking they have been chronic and very much the class in which sulphate of copper is used with advantage.

The method of using electrolysis is as follows :—The negative pole is applied to the cheek and the positive to the everted surface of the upper eyelid. To apply it effectively, Messrs. Down Bros. made me a flattened and curved platinum end ; this can be inserted into the holder which the same firm constructed for me some time ago for use in applying electrolysis to ingrowing eyelashes. The strength of current used is

seldom more than 3 m.a. and should not exceed 5 m.a.
The flattened platinum extremity is passed over the
conjunctival surface of the eyelid ; and it may also be
introduced under the lid into the cul-de-sac. For this
latter purpose it is convenient to use it with the bend
forwards, as it is then easily made to press against the
eyelid and is kept away from the globe. A whitish
frothy trail follows the platinum point which after a
time becomes more tenacious, and adheres a little to
the instrument. The lower eyelid can also be treated,
and the platinum end be carried over any part where
granulations, or thickening of conjunctiva, are present.
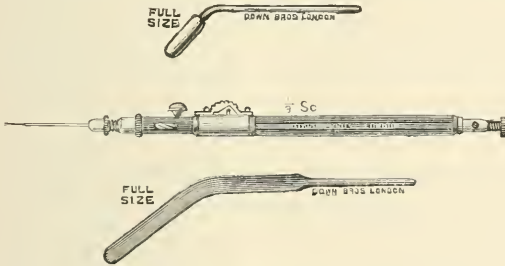
Cocaine is freely used before the operation. The
application even then is painful, but the pain ceases as
soon as the operation is completed. For this reason
it is preferred by those who have had both used, to the
application of sulphate of copper. Nor does much
irritation follow the employment of the battery in the
way described. It may be repeated every few days,
and several cases have had many applications. In one
girl in which the granulations were very exuberant, so
much so that an extensive ectropion embracing the
whole upper eyelid was occasioned, the electrolysis
appeared to be of great service. The platinum probe
was passed over the lid and well pressed on to the
granulations, then it was turned on its side and drawn
across the lid in lines. Expression with Knapp's

forceps and also excision of some of the granulations had previously been practised and sulphate of copper had been applied, but the continuance of the electrolysis appeared to give the best results.

In several chronic cases of trachoma electrolysis has been of benefit. One man who had formerly been treated elsewhere with blue stone, was very decided in thinking that the improvement was more rapid with the new method. It, like every other mode of treatment for the affection, requires time and frequent repetition, and it is suggested now more perhaps as an alternative than as a substitute for other methods.

The rounded probe is used for application to corneal ulcers. It has not, however, given such good results as has the use of the platinum cautery.

A CASE OF TEMPORARY MYOPIA FOLLOWING A BLOW ON THE EYE.

By W. G. LAWS, NOTTINGHAM.

THE patient, a fairly healthy-looking woman, aged 29, came to consult me recently with the history that seven days before, when opening a bottle of ginger-beer, the cork had flown out and struck her on the right eye; this had been followed by much swelling of the lids and pain severe enough to prevent her sleeping for two nights. Both pain and swelling gradually subsided, but she sought advice because she found that she could not see so well as she did before the blow.

On examination the right globe was moderately injected, the iris was congested, the pupil somewhat larger than the left, but it acted promptly to light, and dilated fully with

atropine. The anterior chamber was distinctly shallower than the left. There was a small hyphæma. The tension was noted as between —1 and —2.

Ophthalmoscopically (after atropine) the refraction by estimation was —6 D. at the macula : the fundus was somewhat less brightly visible than in the left eye, but I could not locate any definite opacity in the media ; there was probably slight œdema of the retina in the central region, for the normal striæ about the fovea were coarser and more evident than in the other eye.

She could not read $\frac{5}{60}$ unaided with this eye, but chose —6 D. and with this read $\frac{5}{12}$ partly.

The left eye was emmetropic, and read $\frac{5}{5}$ without a glass. Fundus normal.

The patient was quite sure that the right eye was not in the least short-sighted before the blow, and gave fairly good evidence as to having recently used it separately in such a way that she would have detected a difference between the eyes.

The treatment ordered was rest, atropine and blisters.

On the following day R. V. $= \frac{5}{24}$ with —5·5 D. The hyphæma (when I saw her) was diffused in the anterior chamber. The field of vision was now taken and found to be normal in form but slightly contracted (by about 10° at the temporal side) ; the colour fields were similarly reduced, but were normal in their relationship to each other.

Two days later R. V. $= \frac{5}{14}$ partly with —2 D. ; hyphæma gone ; both disc and yellow spot could now be seen with —2·5 D. ; the appearances were as at the first note.

Two days after this R. V. $= \frac{5}{9}$ partly with + 0·5 D. Eye almost free from congestion ; anterior chamber of same depth as left ; T. still slightly less than normal, but not —1. By estimation the refraction was emmetropic.

There can, I think, be no doubt as to the rapid development of myopia in this eye as the result of the blow, nor of the almost equally rapid return to normal; but there may be some question as to what were the

anatomical changes involved. It is obvious that these changes must have been either (1) in the refractive power of the media, or (2) in their form.

It is conceivable that the aqueous and vitreous might be somewhat increased in density by abnormal exudations from the vessels, but it seems out of the question that so considerable a change in the refraction could be due to this cause alone. On the part of the lens we can hardly suppose that the density of its tissues would be increased by the absorption of inflammatory fluids, but its effect in the refraction of the rays may have been altered by a change either in its shape or its position, and the visible pushing forward of the iris is consistent either with an increased convexity of its anterior surface or a dislocation forward of the lens as a whole. Leaving this point undecided it seems to me that the facts may be most easily explained by the supposition that the lowered tension of the globe allowed of its being compressed by the tension of the sheath of muscles enclosing it ; such pressure would without doubt tend to lengthen the vitreous chamber in the direction of its antero-posterior axis, causing a pushing forward of the lens and relaxation of its suspensory ligament (whose tension must be ultimately dependent on that of the sclerotic) and a pushing backward of the posterior pole, where it is uncovered by muscles.

In this case recovery of normal tension was rapid and no permanent alteration in the shape of the globe occurred. But I have seen at least one case where a considerable degree of permanent myopia had followed a blow on the eye, in which it is permissible to suppose that the lowered tension from ciliary paresis had been of longer duration.

The chief objection to this view of the etiology of the myopia seems to be that we should expect eyes in which the tension is lowered from any cause always to

show an alteration of the refraction in the direction of myopia, and I am not sure that observation bears this out. But if it has a basis of truth it would be interesting to note whether a hypotonic condition of the globe could be made out to be a precursor of the development of myopia in those cases in which an inherited tendency to it exists.

NOTES OF A MYOPIC FAMILY.

By Norman M. MacLehose.

The following cases of myopia are, I think, worth recording, for they form a striking family series, and moreover their consistently high visual acuity, even where the degree of myopia is great, is noteworthy.

My chief object, however, in publishing them is to draw attention to the excellent accommodative power exhibited by each member of the series, in direct contradiction to the general statement of the text books that the accommodation of myopes is nearly always weak. Whether or not these cases are, in this particular, exceptional, is a question for each observer to decide by the light of his individual experience : for my own part I think they are much less so than the dictum of the text books would imply, and that the average strength of accommodation of myopic patients is much higher than is generally admitted.

The family referred to in these notes consists of eight members, and I have given them in order of their age.

Both father and mother were highly myopic, but had good vision with correction. They were not my patients.

CASE I. (a daughter), the eldest of the family, is also not under my care, and I can therefore give no precise details of her condition. I know, however, that she has very high myopia, some 20 D. or so in each eye, and I am told that with her spectacles she is able to see "very fairly well." I merely refer to her case here in order to complete the series.

CASE II.—(Daughter). Seen first April, 1890, then aged 35.

R. V. $<$ $\frac{20}{200}$ c. $\dfrac{-6 \text{ D. sph.}}{-\ \cdot 75 \text{ D. cyl.}}$ $= \frac{20}{15}$. J. 1 from 4 to 7 in.

L. V. $<$ $\frac{20}{200}$ c. $\dfrac{-4 \cdot 5 \text{ D. sph.}}{-1 \text{ D. cyl.}}$ $= \frac{20}{15}$. J. 1 from 4 to 12 in.

With above correction reads J. 1 from 5 to 30 in. with each.

Convergence good. Moderate crescent to outer side of each disc. In R. there is a well-defined pigment line, limiting the outer edge of the crescent. In L. the pigment line is very thin and hardly complete about its centre. Glasses ordered as above. Constant use.

Seen again, April 1897, then aged 42. With same correction which she has been wearing regularly since first ordered. V. (R. and L.) $= \frac{20}{15}$ and J. 1 from 7 in. Fundi as before.

CASE III.—(Daughter). Seen August, 1894, aged 38.

R. V. $\frac{20}{200}$ c. $-$ 4·5 D. sph. $= \frac{20}{15}$ well. J. 1 from $3\frac{1}{2}$ to 11 in.

L. V. $<$ $\frac{20}{200}$ c. $-$ 5·5 D. sph. $= \frac{20}{15}$ well. J. 1 from $3\frac{1}{2}$ to 11 in.

With above correction reads J. 1 from 4 to 24 in. with each. Convergence good.

Fundi normal, except for slight crescent to outer edge of each disc, rather larger in L. than R.

CASE IV.—(Son). Seen first March, 1890, then aged 32.

R. V. $= <$ $\frac{20}{200}$ c. $\dfrac{-12 \text{ D. sph.}}{-1 \text{ D. cyl. ax. horiz.}}$ $= \frac{20}{20}$ 5 letters.

L. V. $= <$ $\frac{20}{200}$ c. $\dfrac{-7 \text{ D. sph.}}{-1 \text{ D. cyl. ax. horiz.}}$ $= \frac{20}{20}$ 2 letters.

With above *full correction* reads J. 1 with R. and L. from 5 in.

Considerable crescent in each, well defined by limiting pigment line.

Ordered as above for distance and 4 D. sph. weaker for reading.

Seen again in January, 1893, then aged 35.

R. V.   Previous correction gives $\frac{20}{20}$ fully.

L. V. c. $\dfrac{-\ 8\ \text{D. sph.}}{-\ 1\ \text{D. cyl. ax.}\ -}$ $= \frac{20}{20}$ fully and $\frac{20}{15}$ 2 letters.

There is a slight increase of the myopia in the L. here, with an increase of visual acuity both in R. and L.   With his former distance correction for the left eye V. $= \frac{20}{30}$.

Seen again in May, 1897, then aged 39.

With last correction V. is now $\frac{20}{40}$ with each eye.

R. V. c. $\dfrac{-\ 14\ \text{D. sph.}}{-\ 1\ \text{D. cyl. ax.}\ -}$ $= \frac{20}{20}$ and $\frac{20}{15}$ nearly.

L. V. c. $\dfrac{-\ 9\ \text{D. sph.}}{-\ 1\ \text{D. cyl. ax.}\ -}$ $= \frac{20}{20}$ and $\frac{20}{15}$ nearly.

Here again note the slight increase of the myopia but no loss of visual acuity.

With above glasses, *i.e.*, *full distance correction*, the patient reads J. 1 with either eye, from 5 to 16 in.

CASE V.—(Son). Seen first October, 1891, then aged 32.
There is no change in the appearance of the fundi.

R. V. $= <\frac{20}{200}$ c. — 10 D. sph. $= \frac{20}{20}$ and $\frac{20}{15}$ partly.

L. V. $= <\frac{20}{200}$ c. — 9 D. sph. $= \frac{20}{20}$ and $\frac{20}{15}$ nearly.

With above correction reads J. 1 with each eye from 6 in.

Convergence good.   Moderate staphyloma down and out in each, limited, especially in R. by well-defined pigment line.

Ordered as above for distance, and 4 D. sph. weaker for reading.

Seen again February, 1897, then aged 37.

V. both for distance and reading as before.   Can still read J. 1 with *full correction* and with each eye separately from 6 in.

CASE VI.—(Daughter). Seen first October, 1890, then aged 30.

R. V. = < $\frac{20}{200}$ c. $\dfrac{- 13 \text{ D. sph.}}{- \ 1\text{·}25 \text{ cyl. ax. } -}$ = $\frac{20}{30}$ and $\frac{20}{20}$ 2 letters.

L. V. = < $\frac{20}{200}$ c. $\dfrac{- 11 \text{ D. sph.}}{- \ 1\text{·}25 \text{ cyl. ax. } -}$ = $\frac{20}{30}$ and $\frac{20}{20}$ 3 letters.

With above *full correction* reads J. 1 with R. and L. from 4 to 18 in.

Convergence good. Both fundi very dark with much choroidal pigment. Moderate crescent to outer side of each disc, defined, especially in R., by an outer limiting pigment line.

Ordered as above for distance, with reading glasses 4 D. sph. weaker.

Seen again (to report) six months latter. No change except that V. of each eye is now $\frac{20}{20}$ 5 letters, *i.e.*, a slight increase of visual acuity. Says she occasionally uses her distance spectacles for reading.

Seen again in August, 1893, then aged 33.

R. V. with same correction = $\frac{20}{20}$ fully and $\frac{20}{15}$ 3 letters.

L. V. with same correction = $\frac{20}{20}$ fully and $\frac{20}{15}$ 5 letters.

Can read J. 1 with *full correction* (R. and L.) from 5 in.

Condition of fundi as originally noted.

In this patient there has been a steady increase of visual acuity without any increase of the myopia.

CASE VII.—(Son). Seen first May, 1890, then aged 26.

V. (R. and L. separately) = < $\frac{20}{200}$ c. $\dfrac{- 5 \text{ D. sph.}}{- \ \text{·}75 \text{ D. cyl. ax. } -}$

= $\frac{20}{20}$ nearly.

With above correction reads J. 1 with R. and L. from 3 in.

Convergence good. Fundi normal; small myopic crescent in each.

Ordered as above for constant use.

Seen again March, 1891.

With same correction, V. of each eye is now $\frac{20}{20}$ and $\frac{20}{15}$ partly; in other words, there has been a slight increase of visual acuity.

Seen again February, 1894, then aged 30.

With old glasses R. V. = $\frac{20}{30}$ partly and L. V. = $\frac{20}{30}$.

By adding — ·5 D. sph. to each, R. V. = $\frac{20}{15}$, while L. V. = $\frac{20}{20}$ fully and $\frac{20}{15}$ partly.

With these spectacles near vision of each eye is J. 1 from 3 to 26 in.

Fundi as before. This case, like the last, shows a steady increase of visual acuity with a very little increase of myopia (·5 D.) in four years.

CASE VIII.—(Son). Seen August, 1891, then aged 23.

$$V. \text{ (R. and L.)} = \tfrac{20}{200} \text{ c. } \frac{-4 \text{ D. sph.}}{-\ \cdot75 \text{ D. cyl. ax. } -} = \tfrac{20}{15} \text{ well.}$$

With same correction reads J. 1 with either eye from 4 to 24 in.

Small choroidal crescent down and out in each.

Ordered as above for constant use.

There is no reason to think that the myopia in these cases is lenticular. On the contrary, the choroidal changes that have taken place, although moderate in degree, are quite marked enough to indicate that the myopia is of the usual character. The pupils were not small.

Finally, the satisfactory condition of the sight is certainly not due to rest and careful nursing of the eyes, for the patients are all hard workers, and accustomed (I refer especially to Cases IV., V. and VI.) to close literary occupation.

D. W. GREENE (Dayton, Ohio). A Case of Un‑
recognised Empyema of the Right Sphenoidal
Sinus; Exophthalmos on Right Side; Œdema
of Face and Neck; Death; Autopsy. *The
Ophthalmic Record, July,* 1897.

The case here reported by Greene is worthy of notice; the clinical notes are, unfortunately, very meagre, and the nature of the disease was established only at the *post-mortem*.

The patient was a man aged 29, a farmer, who had been liable to nasal obstruction whenever he took cold. He was at work on Dec. 3, but had complained of headache for several weeks. On Dec. 4 he went to bed in conse‑ quence of severe headache " at the back of the eyes." He was seen the next day by a doctor, who reported that the man complained of great frontal headache and pain behind the eyes; temperature, 101·5°; pulse, 90; some cough; he was constantly blowing his nose. The same even‑ ing severe pain in the right eye was complained of; the next day (Dec. 6) there was proptosis on the right side, the eye diverged, and the patient said he could not see with it. Temperature was 104·8°; pulse, 88. There was severe fulness of the right side of the face and neck; patient was quite conscious and able to sit up in bed. On Dec. 7 the right eye was still prominent; there was some blood-stained discharge from the right nostril; un‑ consciousness supervened at 4 a.m., and the patient died at 1.15 p.m.

Dr. Greene did not see the patient till 1.30 p.m., fifteen minutes after death; his notes on the external appearances are as follows :—

" The appearance of the face and neck was unnatural and striking, and the exophthalmos on the right side was the greatest I have ever seen, the divergence being also marked. On account of the dry and wrinkled condition of the cornea, an ophthalmoscopic examination was not possible. The left eye was, however, still clear. In this eye there was no papillitis and no retinal hæmorrhage; the

veins were large and tortuous, and the arteries empty like mere threads."

The autopsy was made seven hours after death, and the following conditions were found :

There was marked œdematous swelling of the tissues of the right cheek, extending up over the right side of the forehead, backward to the ear, and downward over the neck almost to the clavicle. A muco-sangineous discharge oozed from the right nostril. The right eye bulged for-wards between the swollen eyelids at least half an inch. Its axis was divergent, and it could be reduced only slightly by pressure. On the left side there was slight œdema of the eyelids, but no congestion of the conjunctiva, and no proptosis.

On removal of the calvaria a large quantity of clear serum escaped, decidedly in excess of the usual quantity. The brain itself was apparently normal except for slight general œdema. The meninges were markedly œdematous.

On removing the brain it was found that the blood vessels occupying the floor of the right anterior and middle cerebral fossæ were engorged with blood ; the dura mater was boggy and opaque, and the anterior clinoid pro-cesses, together with the superior wall, or roof, of the right sphenoidal antrum, were necrotic. The right ophthalmic vein and artery, the right optic nerve and adjoining struc-tures near the clinoid process were matted together by inflammatory lymph. The contents of the right orbit behind the globe were infiltrated with lymph and swollen.

In giving these brief notes of his case, Greene refers to reports of similar and allied cases, which have been published.

A paper by C. R. Holmes [1] appeared last year, in which notes of two cases of disease of the sphenoidal sinuses were given ; one of these was diagnosed correctly and operated upon successfully, the other was not recognised during life.

Another paper, by Henry Gradle, was published in the *Journal of the American Medical Association*, Dec., 1896. In

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[1] See abstract in OPHTH. REVIEW, Nov., 1896.

it the author draws attention to statistics as to the fre-
quency of disease of the bony sinuses of the skull.

Frænkel examined 146 unselected bodies in the Hamburg
Morgue. He found disease in one or more of the sinuses,
maxillary, frontal, ethmoid and sphenoid 63 times.

Wolff reported that in 22 children who had died of
diphtheria, the maxillary sinus was diseased in every
one. In 15 the sphenoidal sinuses were undeveloped, in
the remaining 7 they were invariably diseased. The fre-
quency with which the different sinuses are diseased is
given as follows : first, the maxillary ; second, the frontal ;
third, the ethmoid ; fourth, the sphenoid.

About 25 cases have been recorded in which death
resulted from an extension of disease from the ethmoidal
or sphenoidal sinuses to the meninges of the brain.

J. B. L.

B. NOTTBECK (Marburg). Spurious Optic Neuritis.
Archiv. f. Ophth., xliv. 1.

At a discussion at the Ophthalmological Society of the
United Kingdom, last year, there was a direct conflict of
opinion as to whether an appearance indistinguishable from
optic neuritis, and persisting unchanged for a number of
years with retention of good vision, can or cannot be phy-
siological. How can a structure of such delicacy as the
optic nerve remain inflamed for years together without suf-
fering in function ? asked Mr. Holmes Spicer, whose case
led to the discussion, to which it was replied that clinical
observation showed that such cases do happen. The ques-
tion can hardly be set at rest until pathological evidence is
forthcoming ; meantime, however, the clinical record of such
cases is useful. In the present paper, together with fifteen

admittedly doubtful cases, and three others in which the amount of swelling was under 1 D., there are records of two cases very similar to that of Holmes Spicer. They were as follows :—

(1) A boy of 14 came in 1887, complaining of defective sight since beginning to learn the tailoring trade. R. disc swollen and blurred, especially on the inner side. Vessels full on the inner side, bending abruptly. Elsewhere the fundus normal. V. c. + 5·0 D. sph. $\bigcirc$ + 2·0 D. cyl. axis vertical = $\frac{4}{18}$.

L. vessels as in R., but less blurring of the disc. V. c. + 2·0 D. = $\frac{6}{6}$. In each eye field and colour sense normal.

The case was diagnosed as optic neuritis, more marked in R. than L. ; a mercurial treatment was adopted but no change took place in five weeks.

Three years later, in 1890, the appearances were the same. The swelling of the R. disc was estimated at + 3·0 D., that of the L. at + 2·0 D.

In 1894, *i.e.*, seven years after being first seen, the patient was seen once more. There was no change, and no trace of atrophic pallor.

In this case, of the four conditions (1) blurring of the disc edges, (2) swelling of the disc, (3) persistence of these phenomena unchanged, and (4) good vision, one eye presented all four, and the other eye three, the absence of good vision in this eye being sufficiently explained in the author's view by the astigmatism.

(2) *Girl of Twelve.*—In May, 1893, V. = $\frac{6}{6}$ in each eye. Both discs blurred and grey-red in colour, the right swollen + 2·5 D.

In the summer of 1895 V. was still $\frac{6}{6}$ in each (H. of + 1·0). The R. disc margin was obliterated, especially on the nasal side. A radial striation over the whole disc except the physiological cup was noted, more marked on the temporal side. The disc was swollen 2·5 or 3·0 D. Vessels at the disc margin were tortuous and blurred.

L. disc margins absolutely blurred. Swelling of 1·0 or 1·5. D. Nine months later, *i.e.*, three years after being first seen, the condition was unchanged.

In these two cases it is certainly difficult to conceive that an inflammatory exudation should have remained for years without contracting. On the other hand, in persistent cases, when the signs are much less marked, one can more easily suppose them to represent morbid changes which, being slight in degree, may persist for years without undergoing any marked change. This is not the view taken by the author, who classes together all his cases as probably physiological. Yet one case which he records, from the practice of a colleague, proves that a slight "perineuritis" may persist for thirteen months without any noticeable atrophic change.

It occurred in the inmate of a lunatic asylum, a man of 30, the subject of "syphilitic paralysis," and the following is a summary of it :—

May, 1895.—L. disc-margin blurred. Disc grey-red, as in optic neuritis, vessels not obviously enlarged or tortuous; H. + 1·0 to + 2·0 D.

R. slight myopia. Small temporal crescent. Otherwise normal.

The condition remained unchanged until the death of the patient thirteen months later. It was not found possible to test his vision.

Post-mortem.—R. eye nothing abnormal. L. Intervaginal space widened, with proliferation of connective tissue cells, but no leucocytes. The inner sheath shows cell-proliferation too, but this does not extend into the entrance of the nerve. The papilla is swollen, and larger than on the R. side, but no definite cell proliferation can be made out. The division of the retina into layers can only be made out at a distance of half a mm. from the disc.

Examination of the brain shows thickening of the anterior part of the pia mater, with some atrophy of the convolutions. The description of the ophthalmoscopic appearance in this case reminds one of what Gowers terms " simple congestion," characterised by " undue vascularity, redness, the edges softened but not obscured, and no swelling " (the swelling appears to have only been discovered at the autopsy). "It is rare," says Gowers, "that this condition

is the first stage of an actual neuritis, in which swelling comes on *pari passu* with hyperæmia," but " it is seen as a substantive condition in many cases, commonly preceding atrophy." This is one point to be remembered in con- nection with these cases of blurring of the disc with no marked prominence. Another is that many cases of slight blurring are undoubtedly physiological, and oftenest found in connection with hypermetropia. Since no hard and fast line can be drawn, a great deal must necessarily depend on the standard of distinctness held by the particular observer. It is certainly not uncommon to see the condition described by Gowers as an " undue distinctness of the radiating stria- tion of the nerve fibres," and possibly these cases may have been included by H. C. Bristowe, who found more or less haze of the disc in as many as 29 out of 125 hypermetropes (*vide* OPHTH. REV. for 1891, p. 321). Such cases, however, can surely be differentiated from those in which the disc remains persistently swollen, and it is about these latter, as it seems to the reviewer, that more information is specially needed.

A. H. THOMPSON.

W. SCHIMMELPFENNIG. A Case of Infantile Xerosis of Conjunctiva and Keratomalacia. *Graefe's Archiv. f. Ophth., xliii.* 1.

It seems curious that we should possess so little accurate knowledge of the pathology of a disease which presents so definite a clinical picture as this one, a disease, moreover, which is fraught with so much danger, not merely to the sight but to the life of the patient. The chief points on which more information is required are :—(1) The *rôle* played by micro-organisms in its causation ; (2) the rela-

tionship of the eye affection to that of the general health ; (3) the relationship of the infantile disease to (a) cases of xerosis of conjunctiva with hemeralopia in adults ; (b) cases of xerosis secondary to other conjunctival affections, such as pemphigus.

Schimmelpfennig, before describing his case, gives a summary of the investigations of previous observers. Leber, in 1883, found that the necrotic areas of epithelium were closely studded with micro-organisms, two forms being distinguishable—cocci, single or in short chains, and short bacilli. The same organisms were found after death in the intestines and the kidney. Since he was able to produce the eye affection by inoculation of the cornea of rabbits, he considered that this might be the primary (or only) lesion, and regarded the marasmic condition which is generally present in these cases as due to a coincident affection of the internal organs by the same organism.

Kuschbert and Neisser, in 1884, isolated a bacillus from cases of xerosis with hemeralopia, and succeeded in some cases in inoculating with it the human conjunctiva, where it slowly produced a dry, greasy surface. Having found the same bacillus in the internal organs and fluids of some of the original cases, they supposed the eye affection to be the local development of a general infection. Fränkel and Franke arrived at much the same conclusion, although they were unable to obtain any result from inoculation of the conjunctiva with the bacillus. In a case of infantile necrosis of the conjunctiva, Leber and Wagenmann found masses of cocci in the neighbourhood of and within the smallest arteries, not only in the eye but also in the kidneys and the skin. They considered that the development of the cocci in the blood was primary, the necrosis of conjunctiva secondary. On the other hand, in a very similar case investigated by Bahr and Garnier, these authors came to the conclusion that the eye affection was the lesion by which the organism obtained entrance to the blood.

Braunschweig investigated five cases of the infantile affection, and could find no organisms in the blood ; from the necrotic tissue itself he obtained, in one case only,

colonies of xerosis bacilli and staphylococcus pyogenes aureus. He concluded that the bacillus had no essential connection with the xerosis, but was a harmless sapro-phyte on a tissue whose vitality was lowered by patho-logical processes in the body generally. Schreiber's researches tended to support this view, for he found the xerosis bacillus present in phlyctenular conjunctivitis, in trachoma, in acute and chronic conjunctivitis, and even on the healthy conjunctiva.

Schimmelpfennig's case is that of an infant 18 months old, which had always been weakly. For four weeks diar-rhœa and vomiting had been present, and for four days the eyes had been inflamed. They presented the usual ap-pearances of xerosis conjunctivæ, mucous discharge, slight injection, shining, parchment-like surface, with spots of whitish deposit ; the right cornea was grey, with a central purulent ulcer which had already perforated ; the left cor-nea showed only a slight stippling of the epithelium at its lower part. Death occurred on the second day after admission.

Microscopical Examination. Left Eye.—The corneal tissue proper showed merely some infiltration, with leucocytes in the region of the limbus ; but in the epithelium covering it there were marked degenerative changes, gradually de-creasing from the periphery to the centre : the more super-ficial layers of cells, and also the deepest, were badly stained, granular, and indefinite in outline. At the limbus itself there was a very thick layer of these degenerate cells, and beneath them the columnar cells of the deepest layer showed rapid proliferation. Further out, on the conjunc-tiva, the epithelial layers showed here and there small circumscribed patches of complete necrosis, which ex-tended into the superficial layers of the connective tissue and affected the outer and middle coats of some of the superficial vessels. Further out still, where the epithelial layer became more normal, it was here and there inter-rupted by groups of goblet cells. There was a considerable amount of round-celled infiltration of the connective tissue.

Similar changes existed in the *right eye*, with the ad-

dition of those due to the acute suppurating ulcer of the cornea, which need not be detailed, as they presented nothing characteristic.

The examination for *micro-organisms* of sections stained with methylene blue showed, in the left eye, the necrotic epithelium at the limbus infiltrated with numerous micrococci, lying singly, or in short strings of three or four. In very much smaller numbers were to be seen short rods, sometimes lying among the cocci, sometimes in little groups by themselves. The epithelium of the cornea itself showed no organisms. In the right eye great masses of similar cocci lay in the floor of the ulcer, and could be seen pushing their way between the layers of the cornea at its edges; a single group of rods was to be seen among them in the ulcerated area. In neither eye were any micro-organisms seen in the vessels, nor in the interior of leucocytes.

The author considers that the microscopic appearances indicate an irritant attacking the external surface of the eye, and causing necrosis of the superficial tissues ; and he regards the micrococci, on account of the great preponderance of their numbers, as being the essential agent, rather than the bacilli : it is, in fact, an *ectogenic infection* of tissues whose vitality had been lowered by the long-continued diarrhœa and vomiting. He believes that between such cases as he here describes and the xerosis conjunctivæ of adults no line of demarcation can be drawn, only the necrotic character of the lesion reaches its highest development in infants.

W. G. Laws.

RANNEY (New York). Eye Strain in Health and
Disease. The F. A. Davis Co., New York, 1897.

This volume, of 316 pages, is a record of the experience,
and an exposition of the opinions of an author, who, judged
by his writings, finds in eye strain the cause of a large
number of the " ills that flesh is heir to."

That the author has devoted much time and labour to
the preparation of his book is at once evident. The
number of cases reported is large, and many of them are
given in detail ; several pages of tabulated results also bear
witness to the writer's industry and desire to give fully
the evidence upon which he bases his opinion.

Of the 9 chapters in the book, numbers 2, 3 and 9 are
those which seem to us most valuable. In Chapter 2 the
author gives careful (almost too minute) instructions con-
cerning the application of " Tests of Vision and Ocular
Movements." Chapter 3 deals with headache and neuralgia
due to ocular abnormalities, and Chapter 9 is devoted to
the " Surgical Treatment of the Ocular Muscles." In all
these chapters the oculist will find useful hints, and the
beginner much valuable instruction.

The other portions of the book will not, in our opinion,
convince many that Ranney's beliefs concerning eye strain
and its results are wholly tenable, and few will be able to
endorse them from their own experience. We cannot
altogether dismiss the idea that his judgment of, and
deductions from, the facts he has collected are often biassed.

However, on such questions as " The Bearings of Eye
Strain on the Duration of Life " (Chap. 1), " Eye Strain
as a Cause of Chronic Gastric and Digestive Disturbance "
(Chap. 6), and " The Eye Treatment of Epileptics "
(Chap. 7), we prefer that our readers should form in-
dependent opinions.

The publishers' share in the production of the book is
well worthy of commendation.

OPHTHALMOLOGICAL SOCIETY OF THE
UNITED KINGDOM.

E. Nettleship, F.R.C.S., President, in the Chair.
Friday, July 2nd, 1897.

Spontaneous Dislocation of the Lens into the Anterior Chamber.—
Mr. Bickerton read notes of two such cases. In the first
case (a woman, aged sixty-five years) the right eye had
been lost by an injury twenty-five years before. The sight
of the remaining eye failed suddenly one afternoon without
any injury being received. She was not seen till seventeen
days later, when there was raised tension, vision *nil*, the
anterior chamber being occupied by a partly opaque lens.
The lens was removed without difficulty by a vectis through
a corneal incision. In the second case (a man aged sixty-
six years) cataract extraction had been performed on the
left eye in 1891, a preliminary iridectomy being done on
the right at the same time. In March, 1897, the lens was
found filling the anterior chamber of the right eye, no
injury having been received. Tension was $+3$, and vision
equalled doubtful perception of light. The cataractous
lens was removed through a corneal incision; the cortex
was fluid. The vision with correction after eighty-one
days was $\frac{6}{36}$.

Demonstration of Tscherning's Theory of Accommodation.—
Mr. Priestley Smith showed a model illustrating Tschern-
ing's Theory of Accommodation, and reviewed the evidence
for and against the theory. Helmholtz proved an increase
of lens convexity in the area of the undilated pupil; he
inferred a general increase of sphericity due to slackening
of the zonula. He put forward his theory as provisionally
the most feasible, not as proved. Tscherning, following
Thomas Young, shows that during accommodation the
refraction and the convexity of the lens increase chiefly at
the central area of the pupil, less and less towards the

periphery, and in the peripheral zones not at all ; the lens surface changes from a spherical to a hyperboloid curvature. He shows further that this change can be produced in animals by tightening the zonula. Tscherning's observations relate to :—1. *Spherical aberration :* Did the sphericity of the lens increase during accommodation, the spherical aberration, other things being equal, would increase also. But a study of diffusion circles and shadows cast upon the retina shows no such increase, but the reverse ; the peripheral zones of the lens do not increase in refraction as does the central area. 2. *Scheiner's experiment :* Looking at a point of light through two adjacent pinholes placed before the pupil, the eye sees it single at the distance for which it is focussed and double at any greater or less distance. With an instrument based on this principle the refraction is estimated in different parts of the pupillary area at the same time. During accommodation the increase of refraction, measured in this way, is much greater at the centre than at the periphery. 3. *Reflection from the lens surface in the living eye :* A series of electric lamps placed in a horizontal line before the eye are seen reflected by the lens. The varying degrees of displacement which these reflections undergo during accommodation are an index to the change of curvature in the lens surface, The convexity increases chiefly at the centre, less and less, or not at all towards the periphery. 4. *Reflection from the surface of the exposed lens and traction of the zonula :* The zonula being seized and rendered tense at two opposite points of the circle, the change of curvature occurring in the lens surface is studied by means of images reflected from it in several zones. It is of the character already described. Tscherning holds, therefore, that in the act of accommodation the ciliary muscle contracts so as to increase the tension of the zonula, and to alter the lens surface from a spherical to a hyperboloid form. A given increase of convexity in the central area involves much less change of the general form of the lens than it would according to the assumption of Helmholtz. Tscherning founds his study on the work of Thomas Young, and does full honour to that eminent man

of science. Hess, on the other hand, shows that during strong contraction of the ciliary muscle, especially under eserine, the lens becomes tremulous, and this he declares incompatible with an increased tension of the zonula. Tscherning confirms the observation, but attributes the trembling of the lens to spasmodic action of the ciliary muscle. Hess replies that the lens, besides being tremulous, is displaced laterally, the displacement in all positions of the head being governed by gravity. This, he urges, can only be explained by assuming that contraction of the ciliary muscle slackens the zonula.

Microphthalmos with Cystic Protrusion from the Globe.—Mr. Treacher Collins and Mr. J. R. Rolston read a paper on this subject, based on the pathological examination of seven eyes in which it was present. It was pointed out that though all the specimens were alike in one particular— namely, in being microphthalmic eyes with a protrusion of retinal tissue through a gap in the choroid and sclerotic— they presented great differences as regards the degree of development of the eyeball. The amount of the protrusion of retina varied from a small knuckle of tissue to quite two-thirds of that membrane. In some of the cases the folds of retina had become distended into one or more cysts containing fluids. The region of the globe in which the protrusions were situated was nearly always its lower and posterior part. Speaking generally, the larger the amount of the retinal protrusion the smaller and more imperfectly developed was the eyeball. In some of them the vitreous was very imperfectly formed, being replaced by a kind of fibrous tissue with blood-vessels coursing through it. This so-called "atypical development of the vitreous humour," in which the mesoblast which should have developed into vitreous humour had instead developed into fibrous tissue, was thought to be a matter of consider- able importance, as it served to elucidate cases of congeni- tal amblyopia, which when examined ophthalmoscopically were seen to have fibrous membranes or bands in the vitreous chamber. In one of the specimens they had

found a large plate of well-developed hyaline cartilage embedded partly in the sclerotic and partly in the cornea. They referred to two other somewhat similar cases re corded by Lapersonne and Mitvalsky in which nodules of hyaline cartilage had also been found in the scle rotic. It was thought that the changes in all these cases could be best explained by supposing the retina, through imperfect development of the vitreous or delayed closure of the ocular cleft, to have become much folded, and that one or more of these folds had become extended through the ocular cleft into the subjacent mesoblast, where in some of the cases it had subsequently expanded into fluid-containing cysts. The paper was fully illustrated by lantern slides.

Tuberculosis of the Conjunctiva.—This paper was read by Mr. J. Eyre, who commented upon the comparative rarity of the affection (variously estimated at 1 in 6,000 by Hirschberg, and 1 in 30,000 by Mules), his own cases working out to about 1 in 3,000. The author described the classification put forward by Sattler, in 1891, in which tuberculosis of the conjunctiva was divided into four groups, the first, charac terised by miliary ulceration of the bulbar or palpebral conjunctiva ; the second, by subconjunctival nodules, somewhat resembling trachoma granules ; the third, by superabundant velvety granulations ; the fourth, " Lupus " of the conjunctiva. To these groups the author sug gested adding a fifth, which should embrace those cases characterised by the presence of papillomatous tumours, of the palpebral conjunctiva. With regard to the etiology of the disease, it is impossible to doubt that the bacillus tuberculosis is the active causal factor in the produc tion of the condition. In those cases comprised under groups 1, 2, 4 and 5 the bacilli can as a rule easily be demonstrated in sections of the diseased tissue (by means of suitable staining methods) ; and in group 3, though extremely difficult to detect in tissue, the bacilli give proof of their presence by the result of inoculation experiments carried out upon the lower animals. The affection more-

over must be regarded as the result of the direct inoculation of tuberculous material into the conjunctival tissue, and not as the expression of a general tuberculosis, and means were instanced by which such inoculation might be effected.

As the result of a comparative study of recorded cases, it is noted that the age-limits are wide—a ten months' infant and a thirty year old man being the extremes recorded, the disease is, however, more general at, or soon ofter, puberty, than at other periods. Females are more liable to this particular tuberculous lesion than males, in the proportion of 1·5 to 1. The palpebral conjunctiva of the lower lid is the most frequent seat of the lesion, which is often complicated by keratitis. Glandular enlargement is generally present. Mr. Eyre then described in detail eight cases which had come under his own observation, comprising representatives of each of the groups as follows : group i., one case ; group ii., two cases ; group iii., two cases ; group iv., one case ; group v., two cases. In each of these cases the diagnosis was either made or confirmed by the discovery of tubercle bacilli in sections of the diseased tissue, or by the result of inoculation experiments on guinea pigs. Special attention was directed to the cases in group iv., as in the absence of microscopical examination such cases would present unusual difficulties in the way of diagnosis. Mr. Eyre concluded with a few general remarks upon treatment, laying great stress upon the necessity of early and complete removal of the local lesion.

The following cases and card specimens were shown:—

Mr. Jessop : Sarcoma of Choroid.

Dr. Batten : Case of Spontaneous Hæmorrhage into the Vitreous.

Mr. J. Griffith : Case of Probable Thrombosis of the Cavernous Sinus.

Mr. Holmes Spicer and Mr. Devereux Marshall : Specimens of Tubercle of the Iris.

Mr. Thompson : Unusual Type of Corneal Infiltration.

AUTO-SKIASCOPY.

By EDWARD JACKSON, M.D.

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC; SURGEON TO WILLS EYE HOSPITAL.

AUTO-OPHTHALMOSCOPY has never been made of practical importance. The application of the shadow-test to one's own eye is, however, not only possible, it is nearly as easy as its application to the eye of another, and may be found of considerable import-ance as a means of becoming familiar with the test, and for the investigation of certain problems in physio-logical optics.

Auto-skiascopy requires merely the usual apparatus for skiascopy, and an ordinary looking-glass by means of which the surgeon applies the test to his reflected image, as though it were the patient. This glass in which the surgeon sees his own reflection may be spoken of as the "looking-glass," in contradistinction to the "mirror," which the surgeon holds in front of the observing eye, and uses to reflect light upon the observed eye.

The one eye (the observing eye) is used to study the refraction of the other (the observed eye). Thus with the right eye one can study the refraction in the left eye, and with the left eye one can study the refraction of the right. The small sight-hole necessary for accurate skiascopy, and the brilliant reflection around it, offer practical obstacles that prevent an eye from studying its own refraction.

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The image formed by reflection from the looking-glass is as far behind as the surgeon is in front of it. Therefore, double the distance of the surgeon's eye from the looking-glass corresponds to the distance of the surgeon from the patient in the ordinary skia-scopic examination. If a variable distance is used, as with the plane mirror, the surgeon measures his distance from the looking-glass and doubles it. If he wishes to work at a fixed distance, as one metre, he simply places himself at half that distance from the looking-glass.

For the plane mirror the light, properly shaded, is brought close to the surgeon's eye, as for ordinary skiascopy. It is best placed on the side of the observing eye ; and may well be so much to the side as to be shut off from the observed eye by the bridge of the nose. For the concave mirror the source of light should be some distance behind the mirror, sufficiently to the side of the observing eye to shine upon it, but not far enough to the side to shine on the observed eye, which must be kept as much as possible in the shadow.

Let us consider somewhat in detail what occurs in auto-skiascopy.

First, when the test is resorted to with the plane mirror the light-source close to it sends light to the mirror which the surgeon holds to the observing eye. From the mirror the light is reflected to the looking-glass, from which it is re-reflected to the observed eye ; and forms in it a light area on the retina. From this light area the light emerges, and striking the looking-glass is reflected to the observing eye, through the sight-hole in the mirror. The apparent movement of the light area within the pupil is as would be the similar movement in the pupil of a patient, placed at the apparent position of the image formed by reflection behind the looking-glass. The movements of the light

area are produced by the same movements of the mirror as in ordinary skiascopy ; and the apparent movements in the pupil have the same direction and significance as in the pupil of the patient.

With the plane mirror it is easier to change the distance of the observing eye from the observed eye than in ordinary skiascopy, every inch of change in the position of the surgeon making two inches differ- ence in the distance from the observer to the reflected image. In moving the light away from the mirror to bring out more distinctly the band-like appearance showing the principal meridians of astigmatism, the distance that the light is moved is not duplicated by reflection, but the interval between the light and the observed eye is simply added to twice the distance of the eye from the looking-glass to get the distance of the source of light from the observed eye.

With the concave mirror, to get the source of light in the same relative postion as when placed behind the patient's head, in the ordinary testing of a patient, it is necessary to place it farther behind the looking-glass than the apparent situation of the reflected image. It should be at least one metre or more behind the looking-glass, except when to bring out most ac- curately the meridians of astigmatism it is brought closer to the mirror. With the concave mirror, as with the plane mirror, the direction and the significance of the movements of light and shadow in the pupil are the same as in ordinary skiascopy.

Auto-skiascopy is from the first almost as easy as applying the test to the eyes of another. The double part of observer and observed, each eye taking a different *rôle*, is at first somewhat puzzling ; but when one has become more accustomed to it, it rather facili- tates the test. The observed eye, fixed on the looking- glass, is conscious of the movement of the source of light reflected in the mirror in front of the observing

eye. At first there is an inclination to fix upon this bright light. But, when one has learned to overcome this inclination, the consciousness of the light may be utilised to help to bring the light area properly upon the observed eye.

When watching by reflection the movements of light and shadow in one's own pupil the fixation of the observing eye (and the observed eye also) is upon the reflected image of the pupil of the observed eye. The observed eye under these circumstances has its line of sight exactly perpendicular to the mirror, and were that part illuminated would be in position to see the reflection of its own fovea centralis. But the light is not reflected from the observed eye. It comes from the direction of the observing eye, and therefore, falls upon the retina of the observed eye to the temporal side of the fovea, illuminating this part of the retina, from which the light reflex returns to the observing eye. By auto-skiascopy, therefore, one measures not the refraction at the fovea, nor yet the refraction toward the disc, but the refraction of a point of the retina somewhat to the temporal side of the fovea.

This method of self-examination, requiring no special apparatus, is well worth trying by all who undertake to master skiascopy.

H. WINTERSTEINER (Vienna). Neuroepithelioma (Glioma) of the Retina. Leipzig & Vienna: F. Deuticke, 1897. *Royal octavo, pp.* 460, *with thirty-seven lithographed drawings.*

This is an elaborate monograph on the disease commonly known as glioma of the retina. It is based on a comprehensive study of the literature of the subject and the author's own histological examination of thirty-two cases. It consists of three chief parts, dealing respectively with Pathological Anatomy, with Clinical Characters, and with Etiology and Essential Nature. The abstract of cases fills more than 200 pages. We shall here attempt to present the salient points in a condensed form.

Pathological Anatomy.—When freshly excised and examined, without preparation of any kind, a glioma of the retina presents a soft or semi-fluid mass of milk-white, greyish, or reddish-grey colour, dotted here and there with fine blood points and lines representing divided vessels. In colour and consistence it often much resembles brain substance. It is sometimes semi-transparent, sometimes opaque and cheesy looking. The colour and consistence are not uniform throughout, portions which have undergone degeneration being more opaque and less white than the remainder. In addition to points of extravasated blood some parts are tinged with brown or yellow blood pigment. In the earlier stages the growth is limited to the retina, which is commonly found to be partly or completely detached. It presents one, or more commonly, several nodules which have a smooth convex surface towards the vitreous body, and project mainly outwards towards the choroid. In the neighbourhood of the larger nodules are generally others of much smaller size which hardly project from the surface of the retina and are recognised only by their opacity. The term *glioma retinæ exophytum* is used to indicate this commoner form in which the mass grows chiefly outwards into the subretinal space; a much less common form in which the retina is little, if at all detached, but presents extensive areas of thickening on its inner surface, is termed *glioma endophytum.*

The appearances which characterise the primary growth in the retina are found also in the secondary growths in adjacent structures, but are there more or less modified by the character of the invaded tissue.

The general arrangement of the cells constituting the mass is characteristic and remarkable. They form cylindrical bodies consisting of from ten to twenty layers of cells surrounding a blood vessel like a tubular mantle. In cross section these cylinders present circular areas with the blood vessel in the middle ; in long section they present parallel sides. They stain readily and are thereby sharply distinguishable from the older and degenerated portions of the tumour in which they lie. The young cells obviously develop around minute blood vessels, and by their proliferation compress and destroy the older masses with which they come in contact. The sharp demarcation which is frequently present between the younger and the older masses appears to show that the latter are pushed aside and perforated by the advancing tubular masses.

The cells have a diameter of 8 to 9 μ and contain a relatively large nucleus of 6 to 7 μ diameter, surrounded by a small amount of protoplasm. In form they are roundish, and where modified by mutual compression, have prominent angles and short projections. In certain situations special forms are found. The cells which form the layer which is in contact with the central blood vessel are usually cylindrical. Those which proliferate in confined spaces, such as the meshes between the fibres of the sclera, are often spindle-shaped. Many specimens present peculiar groups of cylindrical cells arranged in a radiating, rosette-like fashion, or in an incomplete ring like a horseshoe ; these appear to be derived from the rods and cones and the outer granular layer of the retina. Ganglion cells, with long, thread-like processes, and giant cells containing three to eight nuclei, are also met with. The origin of the glioma cell is still an open question ; Virchow regarded it as a product of the connective tissue of the retina, or glia, whence its name, but this view is disputed by many. The author advances a new hypothesis.

In the still growing portions of the mass the cells lie in contact with each other without stroma of any kind. The appearance here and there of an intercellular substance is due to the fibrous prolongations of the cells themselves. On the other hand, the secondary tumours in other parts frequently present membranous septa, but these are not a part of the new growth, but consist of the connective tissue of the invaded structure, or of products of chronic inflammation. The cells proliferate by division of their nuclei.

Degeneration of various kinds occurs in the mass while it is still small. The special liability which this particular kind of new growth presents in this respect is probably due to the sparse supply of blood vessels to the increasing mass. The changes which occur are necrosis, fatty and hyaline degeneration, calcification, and hæmochromatosis.

The blood vessels which permeate the mass, and on which the arrangement of the cells intimately depends, are not, as some authors have stated, remarkably numerous as compared with those of other neoplasms, but rather the reverse. In certain spots, however, and chiefly in the more anterior parts of the detached retina, there is great vascularity. The structure of the vessels resembles that of other neoplasms. It is of embryonic type—a tube of endothelium surrounded by a thin layer of connective tissue, but devoid of muscular and elastic fibres. The vessels are therefore like capillaries except that their diameter is much greater. As a result of this incomplete development they are especially liable to aneurysmal dila- tation, and this in its turn leads to stagnation of the blood stream, thrombosis, and destruction of the dependent tissue. Lymph-sheaths, such as are present around the vessels of the normal retina are not discoverable on the ill-developed vessels of the new growth. Hæmorrhage, with consequent discolouration of the surrounding mass, is a frequent result of the vascular degeneration.

The primary seat of an intraocular glioma is invariably the retina. Cases in which the neoplasm has been sup- posed to originate in other parts of the eye have involved

errors of diagnosis. It is impossible to state precisely the respective liability of different portions of the retina, for the neoplasm, unlike sarcoma of the choroid which appears as a solitary growth, often presents itself simultaneously at several places, either in the form of isolated nodules or of a diffuse degeneration. Of 63 accurately described cases, the tumour appeared near to the ora serrata in 12, and in the posterior half of the retina in 51, viz., in 4 at the macula, in 13 at the papilla, and in 34 at other points of the same region. The hinder part of the retina is therefore the most frequent site. The lower part of the retina is most commonly affected, the lateral portion with nearly equal frequency, the upper portion rarely.

The growth originates more frequently in the inner than in the outer layers of the retina, but its starting point is not confined to any one layer, for in one and the same case the growth may be found originating at one point in the outer, at another in the inner granular layer, and at a third in the fibres or in the ganglion cells.

With regard to the mode in which the neoplasm extends, it is to be observed that the division of cases into glioma endophytum and exophytum relates only to naked-eye appearances. The microscope shows that the tendency to grow chiefly inwards or outwards in a given case does not indicate that the starting point was respectively the inner or the outer layers of the retina. The propagation of the growth appears to take place in more ways than one. In the first place the cells infiltrate the meshes of the tissues in which they lie, and thus extend the mass by direct continuity. Secondly, they have been found infiltrating and passing along the perivascular lymph spaces of the retina, and later the lymphatics and glands of the surrounding regions. Thirdly, the cells are occasionally carried to distant parts by the blood vessels. The entrance of the cells into the blood vessels has been proved microscopically, and their transportation to distant organs is made evident by secondary formations in the liver and elsewhere. The small nodules which form secondarily in the choroid probably reach this membrane by way of the

lymphatics or blood vessels. The optic nerve is commonly invaded by direct continuity, the cells passing between the fibre bundles, along the sheaths of the vessels, and sometimes obtaining access to the subvaginal space. Sooner or later the growth perforates the fibrous tunic of the eye, the sclera always before the cornea. Through the sclera the cells pass by way of the channels which give entrance to the blood vessels and nerves, and the perforation takes place most commonly in the posterior region of the globe. Outside the globe the tumour, meeting with diminished resistance, grows with greatly increased rapidity, and quickly infiltrates the looser tissues of the orbit.

Secondary growths beyond the orbit are found chiefly in the brain and its membranes, the bones of the skull and face, and the lymphatic glands. Metastasis to more distant parts is comparatively rare, as shown by the following figures which represent recorded cases of secondary growths :—brain and meninges, 43 ; skull and facial bones, 40 ; lymphatic glands, 36 ; parotid, 9 ; skeletal bones, 9 ; liver, 7 ; spinal cord and membranes, 5 ; kidney, 2 ; ovary, 2 ; lung, 1 ; spleen 1.

The different parts of the eye suffer various secondary changes. The retina, in addition to becoming detached, atrophies and is transformed, where free from the neoplasm, into a thin connective tissue membrane. The subretinal fluid is highly albuminous and, seeing that inflammation of choroid or retina is absent, must be regarded as a passive transudation. The vitreous suffers a continuous diminution of bulk until it completely disappears before the progressive advance of the tumour. The choroid suffers atrophy even before the onset of the glaucomatous stage, probably through disturbance of the whole nutrition of the eye. Inflammatory changes in the choroid are seldom discoverable. The changes found in the iris resemble those which are met with in eyes blinded by primary glaucoma ; adhesion with the cornea and atrophy in the peripheral zone, and more or less atrophy in the remaining portion ; sometimes adhesion of the pupil margin or of the whole posterior surface to the lens capsule

and closure of the pupil by exudation; sometimes vessels visible to the naked eye develop on its surface. In the later stages the iris is invaded by the neoplasm either by direct continuity through its base or, like the choroid, by the development of small nodules scattered over its posterior surface beneath the pigment layer. In some cases the tumour invades the anterior chamber by passing forwards through the iris base or through the pupil, and portions of it undergoing degeneration and necrosis sink to the bottom of the chamber and present an appearance much resembling that of hypopyon. The chamber is of normal depth only in the early stages; in the later, the iris and lens are driven forwards towards the cornea. The ciliary body atrophies, and in the early stages under glaucomatous pressure may become even thinner than the normal choroid. It is frequently invaded by the new growth. Inflammatory changes are seldom discoverable, but there is frequently much degeneration with dilatation of the blood vessels. The lens, except in the very early stage, is displaced forwards; its form is more or less altered by pressure; its volume is sometimes much reduced by malnutrition; in cases of extreme shrinking there may be little beside the capsule remaining; it appears never to be invaded by the neoplasm, but is extruded from the eye when the cornea ruptures. The zonula is sometimes stretched and ruptured, sometimes thickened. The corneal changes are chiefly those produced by the secondary glaucoma, namely, stretching, flattening, and thinning; ulceration occurs when the eye is protruded by secondary growths in the orbit and imperfectly covered by the lids. In late stages the cornea becomes vascular and is infiltrated by the new growth from the ligamentum pectinatum. The sclera undergoes a general distension by the intraocular pressure, and later a localised ectasia and perforation by the neoplasm. The optic nerve, besides being infiltrated by the glioma cells, undergoes excavation by the glaucomatous pressure, the cup being filled by the neoplasm. A certain amount of atrophy of the nerve precedes its infiltration.

Clinical Characters.—Neuroepithelioma (glioma) is met with once in about 2,500 cases of eye disease, *i.e.*, in about 0·04 per cent. This represents the frequency in a total of nearly 500,000 patients in various clinics, chiefly in Germany. It is met with in all parts of the world, and among coloured races as well as among whites, but whether in equal proportion is not yet known.

It is exclusively a disease of early life. In a total of more than 400 recorded cases, two-thirds were observed during the first three years of life ; the oldest was in the sixteenth year. In more than one-third the disease was either present at birth or during the first year, and seeing that it very frequently escapes notice in the earliest stage, a congenital origin is highly probable for many if not for all cases.

No important difference is observable in the liability of the two sexes. The left eye appears to show a slightly greater liability than the right, but the total number is not sufficient to justify a positive statement on this point. In about 20 per cent. the disease is present in both eyes, and of these bilateral cases no less than 90 per cent. were met with during the first three years of life. The appearance of the growth in the second eye is always independent of that in the first. Many cases are on record in which it has occurred in several members of one family, and several in which some members of a family have suffered from glioma, while others have presented congenital malformations such as coloboma of the iris and choroid.

Clinically, the course of the disease is divisible into three stages : (1) the indolent or pre-glaucomatous stage ; (2) the glaucomatous stage ; (3) the stage of extraocular growth. The first symptom, impairment of vision, commonly escapes notice at the outset by reason of the extreme youth of the patient. The first objective sign is usually the silvery, greenish, or yellowish glistening appearance seen under certain conditions of light which gave to the disorder its old name " amaurotic cat's eye." The ophthalmoscope has in a few cases revealed the presence of the neoplasm in its early stage before it had been detected

otherwise. Before detachment of the retina begins, the growth presents the appearance of one, several, or even numerous glistening opaque and more or less elevated patches, usually of roundish form. Large vessels are sometimes seen traversing or entering a mass. Pigment disturbance around the opaque patches sometimes suggests at first glance a choroidal atrophy. The margin of the disc appears ill defined when the retina in its neighbourhood is affected. In some cases the larger patches are surrounded by numerous others of smaller size, and sometimes the vitreous body is studded in many places with nodules of various sizes which swing about as the eye moves.

The glaucomatous stage is generally rather gradual in its onset, but leads before long to abolition of the anterior chamber, dilatation of the pupil, engorgement of the external vessels, and well-marked hardness of the eye. In some cases the onset of the glaucoma is sudden and acute : it may be induced by injury or atropine. By reason of the extensibility of the tunics in early life the secondary glaucoma leads quickly to a general enlargement of the globe involving cornea and sclera alike. A little later the sclera begins to yield irregularly at the least resistant parts; the intercalary zone is usually the first to become staphylomatous, then the region behind the insertions of the recti, more rarely the posterior pole. A ciliary staphyloma may be mistaken for an episcleral nodule, but may be distinguished from it by the fact that the curvature of the cornea is much altered by a staphyloma, little by an episcleral growth. Protrusion of the eye, resulting partly from the increased size of the globe, often also from the beginning of extraocular growths behind the eye, is common at the same time. The protrusion leads to exposure, ulceration, and destruction of the cornea.

Temporary improvement with apparent arrest of the growth and sometimes shrinking of the eye is not very uncommon. The cause of this is usually an acute inflammation presenting the characters of panophthalmitis or plastic irido-choroiditis. In the former case a corneal

ulcer is usually the point of infection, and when the cornea ruptures a large part of the contents of the globe escapes ; in the latter the inflammation leads to shrinking without rupture of the tunics. A further development of the tumour always occurs after a few weeks or months. Permanent cure by this process is unknown.

The glaucomatous stage is brought to an end, and the suffering of the patient often much relieved, by the perforation of the cornea. Very soon afterwards the growth makes its appearance externally, and, being now free from the intraocular pressure, increases very rapidly. Its surface being unprotected by epithelium is easily eroded, and hæmorrhage is apt to occur. The mass steadily increases in size, extending downward over the cheek and distending the conjunctiva and the eyelids, the latter being sometimes enormously attenuated and exhibiting large blue veins beneath the skin. It may reach the size of a man's fist or even of a child's head, and by reason of the offensive discharge presents a truly horrible condition. During the period of extraocular growth the secondary affection of glands and other neighbouring tissues rapidly advances. Death may occur with general convulsions or coma through invasion of the brain, or it may be due to the cachexia which results from the drain on the system through the necrosis and ulceration, or to blood poisoning. Occasionally the child dies with suffocation arising from invasion of the medulla or spinal cord, or from stoppage of the larynx. Profuse hæmorrhage through injury of the tumour, and purulent meningitis following extirpation of the eye, are occasional causes of death.

The duration of the whole disease, when left to itself, is on the average about one and a-half years, but may be as much as three years, or as little as twenty-three weeks. The duration of the several stages cannot be stated with precision. The indolent stage is in the majority of cases from six months to one year, or a little longer. The glau-comatous stage varies from a few weeks to twenty-one months, the average of 32 cases being seven months. The

average duration of the final stage in 40 cases was four months.

The Diagnosis of the glioma is beset, in some cases, with much difficulty. Statistics on a large scale show that about 25 per cent. of the eyes which are excised on account of a supposed glioma, prove after excision to be actually lost through a disease of some other kind. On the other hand, a glioma actually present sometimes remains hidden and undetected by reason of such conditions as opacity of the cornea arising from other causes, opacity of the lens, blood in the anterior chamber, irido-choroiditis, &c. The various conditions which simulate glioma are classed under the general term pseudo-glioma. They include simple detachment of the retina, especially when the subretinal space is occupied by serous fluid which drives the retina far forward, the tension being increased ; leucosarcoma of the choroid, though this is extremely rare in young children ; tubercle of the choroid, especially in the latter stages, when it fills the vitreous chamber and the tension is raised ; and chronic inflammatory conditions of the choroid and ciliary body, with exudation into the vitreous. The latter constitute the majority of cases of pseudo-glioma. The distinguishing characters of inflammatory pseudo-glioma, as ordinarily described, are a yellow metallic appearance, an absence of blood vessels, a smooth surface, a diminished tension of the globe, and sometimes the presence of synechia posterior, but in exceptional cases a true glioma presents each or all of these characters. Suppurative hyalitis, cysticercus in the vitreous chamber, and in several instances congenital anomalies, especially posterior polar cataract, with persistence of the hyaloid artery, have all been mistaken for glioma. Lastly, hæmorrhage into the vitreous leading to the formation of false membrane, and granuloma springing from a prolapsed iris, have led to errors of diagnosis. The earliest stage of glioma may be mistaken for some form of retinitis or neuritis.

The Treatment of glioma is almost exclusively surgical. Spontaneous cure is unknown. Mercury, antimony and

dieting, &c., employed under the idea that the local disease was the expression of a general disorder, have proved powerless. Recent attempts to discover an efficient serum therapy have likewise failed. A 2 per cent. formalin solution is useful as a means of drying and deodorising the gangrenous surface in the later stages. In the same stage drugs may be required for the relief of pain and sleeplessness.

The surgical treatment is either enucleation of the eye or exenteration of the orbit, the former when the tumour is still entirely intraocular, the latter when it has already escaped from the eye. In every case of enucleation the divided nerve should be examined upon the globe, and when there is any suspicion of its being invaded by the growth, the nerve should be again divided as far back as possible for more complete removal.

The Prognosis is, as a rule, definitely good when no recurrence has occurred twelvemonths after the operation. Tested by this rule, statistics of nearly 500 cases show permanent freedom from recurrence in 16 per cent. a higher percentage than has been found in cases of choroidal sarcoma. By reason of operating in an earlier stage cases of cure are now much more frequent than formerly. They belong almost exclusively to the group in which excision is performed in the first or second stage, though isolated cases of permanent cure after exenteration of the orbit show that operation may be justifiable even after the growth has escaped from the eye. When recurrence occurs it usually comes sooner or later according to the stage of the disease at the time of operation. In a series of cases operated on in the first stage, the average interval before recurrence was noted was four months ; in the second stage, two to seven months ; in the third stage, two months.

The Etiology and Essential Nature of glioma of the retina are still undecided. The supposed connection with scrofula and other so-called diathetic conditions is no longer tenable. A traumatic origin is not established by any evidence hitherto advanced : in certain cases an exudation following

an injury has been wrongly diagnosed as glioma ; in others an eye already affected with glioma has suffered injury in addition. Bacteriology has afforded nothing but negative evidence concerning the nature of the growth, for in spite of its analogies with certain infective processes, inoculation experiments have failed to transmit it, and no bacteria have been discovered in it other than those which would enter readily during the ulcerative stage. The significant facts in relation to its etiology are that it occurs only in early childhood, and is very frequently, if not always, truly congenital ; that in one-fifth of the cases at least it affects both eyes ; that it sometimes affects several members of one family ; and that it is in certain cases associated with congenital defects of the eye or other parts, *e.g.*, microphthalmia with maldevelopment of the retina, persistent pupillary membrane, and coloboma of the optic nerve.

Concerning the essential nature of the tumour, the author puts forward a hypothesis based on the discovery in many cases of the peculiar rosette-like groups of cells already referred to. It accords with the theory of Cohnheim, which attributes neoplasms in general to the presence in the affected organ of particles of embryonic tissue which fail to undergo the normal development but retain their embryonic character and subsequently take on an active morbid growth. The rosette-like bodies represent groups of cells derived from the external granular layer of the retina. They are discoverable not only in the primary growth but, like the characteristic cells of adeno-carcinoma, in the secondary growths also. The tumour is therefore to be regarded as a product of overgrowth of certain embryonic cells proper to this layer, which, during the process of development, have become disseminated through other parts of the membrane. The fact that the tumour may originate in different layers of the retina and yet present the same structure is explained by this hypothesis.

It is true that cells derived from the connective tissue or glia are usually present in the primary tumour, but this does not show that the tumour originates in such cells ; on the contrary, the fact that glia cells are never discoverable

in the secondary growths, while the rosette-like bodies are found there, tends to show that these latter are the essential constituents and indicate the origin.

Glioma, as described by Virchow, is a morbid growth originating in the neuroglia, or connective tissue of nerve substance. If the origin of the so-called retinal glioma be as here suggested, the name is not truly applicable, for the retinal layer in question is devoid of connective tissue. Its cells are of epithelial character, and the tumour to which they give rise should therefore be classed as an epithelioma. Throughout the present work the term *neuroepithelioma of the retina* is used by the author.

P. S.

P. STEFFAN (Frankfort on M.). On Strabismus. *Arch. of Ophthalm.*, *xxxv.*, 2 *and* 3, *p.* 200 (German Edition).

It has always been considered difficult to account for the fact that a child beginning to squint is either not troubled by diplopia at all, or at worst only slightly so, and for a short time, thereby greatly differing from the adult patient with paralytic strabismus. The time-honoured explanation, stated already by von Graefe, attributes the absence of diplopia to a voluntary forcible suppression of the image of the deviating eye, producing thereby an amblyopic state " through non-use."

At the present date we cannot any longer admit the idea of amblyopia through non-use. If this occurred, the degree of amblyopia ought to be in some measure proportionate to the duration of the squint. But such is not the case, and all instances of alleged improvement of vision after tenotomy have been found to be badly observed. We are compelled therefore to consider this unchangeable amblyopia as a congenital, and at the same time station-ary, one. This view, however, does not explain by itself why children who begin to squint differ so widely from the adult who is attacked by paralytic strabismus.

21

Von Graefe's explanation of the suppression of the visual act in the squinting eye pre-supposes binocular vision to be a congenital compulsory arrangement. This "nativistic" view cannot be upheld any longer. The child has to learn the rational use of his eyes in the same way as that of his other senses. Embryologically we know that in the eighth fœtal month—at a time when the fœtus, in case of premature birth, is capable of living— the whole visual tractus, from the eye right up into the transcortical fibres, consists of axial cylinders only, without any medullary sheaths; i.e., every possibility of isolated conduction in those nerve fibres is still absent. At the end of normal gestation the formation of the medullary sheaths has already begun, but it takes several months (end of the tenth month) before its centripetal advance is completed.

Correct visual impressions can only be obtained when our visual centre in the grey cortex of the occipital lobe has been connected with the centre of the other senses, with the motor centres of eye muscles, speech, extremities and especially of the right hand. Before all these paths have been formed anatomically and their use practised and well assured physiologically, years are required. The new-born infant has no idea of form, colour and space, his visual perceptions are nothing but a vague impression of light and dark.

Neither is normal binocular vision "nativistically" congenital. We can prove this by observing cases of congenital cataract operated upon at a later period of life, when the mind has long been sufficiently developed; distances, movements in space, colours, &c., are not recognised at all correctly at first. We have, therefore, here a state of *physiological* mind blindness in which the nerve paths of the visual sphere have not yet been used.

In children from 2 to 4 years of age the lesson of seeing has not been "learned" firmly. Cases are well known where children of that age become apparently blind after a blepharospasm of a few months' duration. No patho-logical change can be detected, and the apparent blindness

disappears within a few weeks after the blepharospasm has ceased.

If the visual act has once been thoroughly mastered, as in the adult, the lesson thus learned cannot again be forgotten, and remains permanent.

On the other hand, a child born with normal eyes can never be really blinded by preventing it from using its eyes. All that could be effected thereby would be a state of mind blindness which would vanish as soon as the obstacle to using the eyes had been removed. The stimulus of light enforces the function of the visual organ in every animal that lives exposed to light. Under its influence we see the formation of the medullary sheaths beginning in the periphery of the optic nerve and proceeding centripetally. A prematurely born child of the eighth month develops these medullary sheaths so rapidly that they are more advanced after one month than in an infant born at the normal end of gestation.

Amblyopia through non-use does therefore not seem to be intelligible.

Defective binocular vision in strabismus, as well as the formation of abnormal retinal identity, is due to abnormal, *i.e.*, defective learning of the visual act of both eyes during the first years of life. The different forms of its manifestation are due to the individually different degrees of the defective learning in the visual lesson.

Equally so all the co-ordinated movements of our eyes and eyelids, whether associated, accommodative, or both, are acquired *empirically* during life. Preyer's careful observations show that in the new-born one eye very often moves independently of the other, and that head and eyes often turn in opposite directions. It is only after three months that proper co-ordination of the ocular movements becomes established. A pre - established arrangement, by which co-ordinated and symmetrical eye movements are affected, does not exist. In the new-born each eye follows originally its own innervation. And while in the normally developed adult both eyes accommodate equally and evenly, the child, during the time

it learns to see, may accommodate wrongly, unequally. Herein we may probably have an explanation of the not infrequent development of unequal refraction in originally isometropic eyes.

There remains another question to answer : Whence this congenital amblyopia without abnormal ophthalmoscopic signs ? The answer to this may be found in the various lesions from pressure to which the retina or optic nerve are so often exposed during and shortly before birth. Retinal hæmorrhages have been observed to occur with extraordinary frequency in the new-born. Naumoff found these changes not only in abnormal, but also in quite normal cases of birth, and the narrower the maternal pelvis and the longer the act of parturition, the more frequent the changes.

In concluding his interesting paper the author comes to the practical question of therapeutical interference, and strongly expresses himself against early operation. He advocates the delaying of any operation as long as possible, for fear of those exceedingly disfiguring " over-corrections." We do not share the author's ideas in this respect, nor his fears either. On the contrary, we should feel that his views on the slow formation of the retinal identities would be a strong inducement to favour an early operative interference with the abnormal position of the eyeball.   K. G.

AMERICAN OPHTHALMOLOGICAL SOCIETY.

THIRTY-THIRD ANNUAL MEETING HELD AT WASHINGTON, 1897.

Dr. G. C. HARLAN, President, in the Chair.

Exophthalmic Goitre with Panophthalmitis. — Dr. J. A. Spalding (Portland, Me.) reported the case of a man, aged 30, who, after working harder than usual, noticed diplopia, and was told he had paralysis of the internus. A few weeks later the right eye began to bulge forward, and the sight was sensibly diminished, so that he suffered less

from the diplopia. Enlargement of the thyroid on the right side was now evident. This enlargement, with disturbance of the heart's action and the protrusion of the eye, continued to increase. The cornea became grey and hazy, and sight was reduced to perception of large objects close to the eye.

When first seen the eye was enormously protruded, the lids could not be closed, the conjunctiva formed a dry fleshy wall round the cornea, which presented a small abscess with hypopyon. Other means failing to relieve pain the eye was removed, pus being found behind the ciliary processes, and in a separate focus in the vitreous. After removal of the eye the orbital tissues pressed forward between the lids, preventing their closure, except by actual force, and the whole orbit after two years still remained filled with hard brawny tissue. Four months after removal of the right eye the left became affected in the same way. The ophthalmoscope revealed extremely tortuous retinal veins, and later severe papillitis. In ten days it had run the same course as the right, and compelled enucleation.

Exophthalmic Goitre following Ether Anæsthesia.—Dr. Wm. F. Aiken (Savannah) reported the case of a woman, aged 41, to whom ether had been given for a cervix operation, and in whom prominence of the eyeballs was noticed during anæsthesia ; this condition continued subsequently. When seen seven months later there had been some improvement, but she still presented the typical appearance of exophthalmic goitre. She was found to have rather high hyperopia with astigmatism, and correcting glasses were given for constant use. No treatment appeared to benefit her perceptibly, but she gradually continued to improve until, after six years, all signs of the disease had passed away. It was suggested that the suddenness of the onset during the congestion and excitement pointed to the occurrence of hæmorrhage most likely in the fourth ventricle.

Pulsating Exophthalmos.—Dr. W. H. Wilder (Chicago) reported three cases.

The first was in a man, aged 30, who had had syphilis fifteen years previously. The trouble began with neuralgic pain in the right eye, followed in a few hours by redness of the eyeball, and two days later by swelling of the lids and surrounding parts. When first seen the eye protruded 12 mm. Pulsation of the globe was distinct and also pulsation of a large vessel at the inner and upper part of the orbit. The retinal veins were distended, but no pulsation was observed. Heart sounds were normal, but a loud bruit was heard at the point of division of the external carotid artery. Compression on the carotid stopped the bruit and roaring noises heard in the right ear. Ligature of the artery was advised and refused. No material change occurred in his condition during a year.

The second case occurred in a man, aged 30, who sustained a crushing injury of the head. On recovering sensation there was a roaring and throbbing in the head, and a day or two after the accident the right eye was protruding, reddened and pulsating, with the sight impaired. The left eye remained unaffected. The right carotid was ligatured and prompt cessation of the pulsation and pain occurred, but both returned about three days later. The left carotid was tied three months afterwards, and a few days later paralysis of the right side, with aphasia and partial loss of taste occurred. The aphasia gradually disappeared and the paralysed side improved. The right eye was blind, and six months after the second operation the left developed an inflammation which soon disturbed vision and left a dense leucoma and ciliary staphyloma.

The third case was of a man, aged 33, who also had his head severely crushed. Very soon after the accident he was troubled by rushing noises in his head with each pulsation of the heart. Six weeks later he had diplopia, but this gradually disappeared. Soon after the injury the right side of his face was completely paralysed, and the eye began to protrude and pulsate. At the end of ten years there was marked exophthalmos of the left side, increased on bending forward. The upper lid is swollen, and at the upper and inner side of the orbit are two large vessels that

pulsate visibly. A loud bruit is heard from the eye and less distinctly over parts of the head. Vision in the eye is $\frac{20}{60}$; the other eye is normal. Now, thirteen years after the injury, the man works regularly as a switchman.

The literature of the subject shows 14 cases of spontaneous recovery, 4 cases of permanent cure by compression of the carotid, and of 87 cases in which the carotid was ligatured 52 were cured and 10 died.

Exophthalmos from Sarcoma of the Dura. — Dr. S. M. Burnett (Washington) reported the case of a mulatto girl brought to him when 5 months old, whose right eye had been protruding for two months and was turned strongly outward, there being paralysis of all the muscles, except the external rectus. The fundus was unchanged. There was a diffuse swelling in the temporal region of the right side. This softened, and an incision allowed two ounces of brownish-yellow liquid to escape, and disclosed a cavity of corresponding size inside the cranium. This cavity closed at the end of three months. Nearly two years later the child was in perfect general health, with still some swelling of the temple and the same ocular conditions. The right eye was quite blind. Suddenly the left eye became blind and began to protrude ; the swelling increased and involved the base of the nose, and rapid emaciation and death followed. A sarcoma $2\frac{3}{4} \times 2\frac{1}{2} \times 1\frac{1}{2}$ inches was found, not extending within the dura, having apparently started at the sphenoid and entirely destroyed the ethmoid. The optic and third nerves passed through the tumour, and there was partial absorption of the right frontal lobe, but otherwise the brain was normal.

Chronic Membranous Conjunctivitis.—Dr. L. Howe (Buffalo) reported two cases. The first patient, a boy, aged 10, was shown to the Society. Eighteen months before he had been brought for swelling of the right upper lid with some conjunctival discharge. The upper palpebral conjunctiva was covered with a yellowish-white membrane two or three millimetres thick, with sharply defined edges firmly attached to the lid. Its removal with a blunt spud left a bleeding surface. This membrane continued with exacer-

bations, at one of which he had, with extension of the ocular membrane, patches of similar membrane in the tonsils, and a rise of temperature to 103°. Two children with whom he came in contact in the ward developed diphtheria and died. Most varied and persistent treatment had failed to cure, although under formaldehyde solutions the patch had recently contracted and grown thinner.

A younger sister of this patient became similarly affected in both eyes, and in spite of treatment grew worse ; subsequently she developed scarlet fever, and both corneæ became necrotic. Careful bacteriological examinations of these cases showed, at the time of exacerbations and scarlet fever, Klebs-Lœffler bacilli, which were absent at other times. There was constantly present in both cases a peculiar diplo-streptococcus.

Diphtheritic Conjunctivitis was the subject of a paper by Dr. Myles Standish (see page 133).

Dr. J. E. Weeks (New York) urged that our classification of disease of the conjunctiva and ulcerative diseases of the cornea should be based on a bacteriological foundation. He reported a case similar to those of Dr. Howe's in which the disease ran its course, one cornea being destroyed after several months, while the other eye was saved. He also had found a streptococcus, but no Klebs-Lœffler bacilli.

Dr. G. E. de Schweinitz (Philadelphia) had seen a case in which were only moderate membranous deposits on the conjunctiva, and there was rapid corneal involvement. The bacteriological examination showed the Klebs-Lœffler bacilli, but antitoxin was not used.

Ophthalmia Neonatorum in Public Institutions.—Dr. Howe urged the value of the Crédé method for the prevention of blindness due to this disease; statistics of 54,000 cases showed that it reduced the percentage from 9·2 to 0·65 per cent. He urged that the application of the 2 per cent. solution of nitrate of silver should be made obligatory for all children born in public institutions.

Operations in cases of Cicatricial Orbit.—Dr. George C. Harlan (Philadelphia) reported three cases for extensive

cicatricial bands preventing the introduction of an artificial eye (see p. 95).

Ivory Exostosis of the Orbit.—Dr. W. F. Norris (Philadelphia) reported the case of a man, aged 24, who had noticed a tumour at the inner side of the right orbit for six years, and attributed it to a blow received in this region four years earlier. The tumour had recently grown more rapidly, and its growth was associated with occasional severe headaches and giddiness. The tumour was most prominent just above the internal palpebral ligament. There was constant epiphora, and the movements of the eye were limited outward and upward. The growth was loosened by the use of a gouge and mallet. It grew from the orbital plate of the ethmoid and the lacrymal bone ; it measured 41 mm. × 25 mm. and had a base 24 mm. × 20 mm. On section no Haversian canals were found.

Dr. R. Sattler (Cincinnati) stated that in the case reported to the Society last year (see vol. xv., p. 242), necrosed bone was discovered eight months after the operation. Attempting its removal an additional exostosis was found concealed behind the orbital margin and extending upward, the orbital plate of the frontal bone having yielded so that a cavity as large as a pigeon's egg resulted. This second growth was removed and the subsequent progress was favourable.

Dr. Jackson had recently heard of a case reported five years ago. The patient was still well, with good vision and no deformity.

Intraocular Enchrondroma.—Dr. Edward Jackson (Philadelphia) reported the case of a woman, aged 57, suffering for nine months from symptoms of an intraocular growth, with complete blindness and increased tension. The diagnosis of probable sarcoma was made and the eye enucleated. A tumour was found extending from the *ora serrata* on the nasal side to 6 mm. to the temporal side of the macula ; and vertically from slightly to the nasal side of the upper end of the vertical diameter to about 5 mm. to the temporal side of that diameter below. Anteriorly its margin was abruptly limited ; posteriorly there was a

gradual transition into the normal fundus. The mass of the tumour was entirely free from vessels, translucent, and found on section to consist of hyaline slightly granular cartilaginous tissue, containing cavities like nests of cells in hyaline cartilage, but in which were no nuclear elements. There was in the mass a slight deposit of calcareous granules. The patient gave a history of an entirely normal eye until the sudden loss of sight and increase of tension nine months before.

Angio-Sarcoma of apparent Retinal Origin.—Dr. W. B. Johnson (Patterson, N. J.) reported the case of a woman, aged 23, who had lost the sight of the right eye twelve years before, but it caused no discomfort until within three months, when there developed pain, redness and increased prominence of the eyeball amounting to one quarter of an inch. The diameter of the cornea was one-eighth of an inch greater than that of the left eye. The iris was pigmented and swollen, and adhered to the lens capsule. The vitreous appeared nearly filled with a bright yellowish body which was vascular. On enucleation there was found a greyish mass in the centre of the vitreous surrounded by detached retina, with a hæmorrhage at the nasal side which occupied almost half of the vitreous chamber. The tumour was intimately connected with the outer part of the retina, and was composed of small round cells and degenerated blood-vessels.

Steel embedded in the Crystalline Lens.—Dr. Thomson (Philadelphia) reported the further history of the case of iron in the crystalline lens previously reported by him (see page 96). After the lens became too opaque to perceive it, the presence of the foreign body was demonstrated by the Roentgen rays, and by extraction of the lens the bit of steel was removed within it.

Location of Foreign Body by the Roentgen Rays.—Dr. C. A. Oliver (Philadelphia) demonstrated the method of determining the location by repeated exposures, with the source of the rays placed at fixed distances and set situations so as to give a multiplied series of related angles and lines from which the exact position of the foreign body could

be determined. He had used the method in three cases, in two of which the foreign body was found outside of the eye in the orbit, and in one within the eye-ball.

Dr. Thomson reported a case in which the position of a piece of steel had been accurately determined by Dr. Wm. M. Sweet, and the foreign body had been removed in the midst of a mass of firm connective tissue, it having entered the eye eight months before.

Dr. Sweet's method included the use of an indicator in the line of vision 4 mm. in front of the centre of the cornea; and another indicator 12 mm. to the temporal side. Two radiographs were taken from different points of view, and the position of the shadow of the foreign body relative to the shadows of the indicators showed the exact situation of the former. The indicators were fixed by a headband and were adjustable for any convenient position. The data furnished by their use gave a very accurate determination of the position of the foreign body.

Congenital Epicanthus and Ptosis.—Dr. R. Sattler (Cincinnati) had seen a patient presenting these conditions for which operation had been done at eight years of age. There was complete lack of power in the levators, and imperfect compensatory action of the occipito-frontalis muscle. There was no family history of such trouble. He married a healthy woman with equally good family history; but the four children, all boys, had congenital ptosis and epicanthus. The levator muscles were useless, but there was an increased compensatory action of the occipito-frontalis. The epicanthus, however, required operation, and this was done by seizing the fold and dividing it horizontally, and then dissecting out a small triangular piece upwards and downwards. This permitted a coaptation of the wound, and the scar served to increase control of the lid by the occipito-frontalis. The operation also relieved an inversion of the lid border near the inner canthus which caused unpleasant lacrymation.

Operation for Ptosis.—Dr. W. H. Wilder (Chicago) described an operation for congenital and paralytic ptosis with complete loss of power in the levator. An incision,

one inch and a half or more in length is made above, and parallel to the orbital margins going down to the periosteum. The skin and muscle are then dissected up from the fascia down to the tarsus, and sutures are then introduced into the tarsus, each with several dips into the tarso-orbital tissue to serve as a gathering stitch, after which it is made to pass through the muscle and connective tissue of the upper lip of the wound. These sutures are then drawn up tight and cut off, being left buried in the wound which is closed with fine sutures. The buried sutures become encapsuled and give additional strength to the folds of fascia that hold up the lid.

Traumatic Ptosis.—Dr. Oliver reported a case in which resection and advancement of the levator muscle was done for ptosis following a jagged wound made in the superior *cul de sac* of the conjunctiva.

Periscopic Lenses.—Dr. C. M. Culver (Albany) urged the advantages of periscopic lenses, and suggested that cylindrical lenses could always be given this form by using a concave cyclinder with a stronger spherical for the correction of hyperopic astigmatism ; and the convex cylinder with a stronger concave spherical for myopic astigmatism, and turning the concave surface always toward the eye.

Combination Lenses.—Dr. W. Thomson showed an achromatic combination for a cataract glass, and a bi-focal lens ground with a single curvature of lens. These were made by cementing together pieces of crown and flint glass.

Change in Refraction with Glycosuria.—Dr. S. D. Risley (Philadelphia) reported two cases of very marked and rapid change in refraction associated with variations in the amount of sugar secreted in the urine. In one case the change amounted to between 3 and 4 D. In the other it was about 1 D. In both patients there occurred diminution and increase of refraction with diminution and increase in the amount of sugar. The first patient was aged 49 ; the second 74.

Cataract Operations.—Dr. R. L. Randolph (Baltimore) reported a series of two hundred cataract operations,

with seven failures, and two cases of optic atrophy;
55 per cent. gained vision of $\frac{20}{100}$ or over.

Hæmorrhage attending Cataract Extraction. — Dr. O. F.
Wadsworth (Boston) reported five cases in which the
sight had been destroyed by this complication. In one
case there was enlargement of the perforating veins and
doubtful increase of tension. In a second there was en-
largement of the veins, but the tension was normal. In
a third there was a history of injury in childhood, and
the patient died of apoplexy within a year afterwards.
The fourth patient had previously lost an eye by pan-
ophthalmitis, following extraction by another surgeon.
In the fifth case the eyes appeared normal, except for the
cataract; but hæmorrhage in the posterior portion of the
globe commenced promptly after corneal incision. In
another case where one eye had been lost by hæmor-
rhage, following extraction by another operator, simple
extraction was done under cocaine, and the result was
in every way favourable.

Dr. S. B. St. John (Hartford) called attention to the
possibility of doing cataract operation without a skilled
assistant. Before doing iridectomy he instilled cocaine
into the anterior chamber and found fixation during that
stage of the operation unnecessary.

Dr. D. Webster (New York) reported one case; and
John Green (St. Louis) two cases of hæmorrhage following
extraction.

Cholesterine Crystals in the Lens.—Dr. L. A. W. Alleman
(Brooklyn) reported the case of a child with congenital
cataract, seen when 20 months old, with the opacity chiefly
in the posterior layers and numerous shining particles in
the lens. After a needle operation these crystals were
diffused in the anterior chamber, showing that a layer of
the lens had been fluid. The lens matter subsequently
removed by suction showed typical cholesterine crystals.

Location of a Foreign Body by Scotoma.—Dr. C. A. Oliver
(Philadelphia) reported a case in which a piece of steel
entered through the cornea and lodged in the vitreous.
No fundus reflex could be obtained, the vitreous being

filled with extravasated blood. The field of vision showed a sharply defined defect in the upper and inner periphery. An incision was made between the external and inferior recti muscles, and the chip of steel removed with the magnet.

Taxis in Increased Intraocular Tension.—Dr. S. O. Richey (Washington) pointed out the long distance which some of the perforating veins run in the sclera, and urged that venous stasis was an important factor in chronic glaucoma. This can be largely removed by a form of manipulation resembling taxis for the reduction of hernia. It was an imitation of a normal function of the lids and extraocular muscles, which required aid in a state of high intraocular tension.

Retinitis Proliferans.—Dr. J. E. Weeks (New York) reported the results of the microscopical examination of two eyes presenting this condition, with the history and ophthalmoscopic appearances; and presented a *résumé* of the literature of the subject. The age of the patients ranged from 8 to 52 years, but 18 out of the 27 cases studied occurred between 15 and 20 years. The essential feature is the production of membranes extending from the retina into the vitreous humour, the cases being diphtheritic, syphilitic, or following traumatism. Hæmorrhage in the vitreous occurs before these new membranes are formed, and the membranes are continuous.

Retinitis Circinata.—Dr. F. Fridenberg (New York) reported a case of this disease occurring in a man, aged 70, in good health, his only complaint being that of failing vision. His urine (examinations were repeated through several months) was always found normal. The retinal veins were markedly tortuous and varicose, and the region surrounding the macula presented a wreath of white spots. To the temporal side of this was a still more striking circle of white exudation. There were a few small spots of hæmorrhage.

Toxic Amblyopia.—Dr. G. E. de Schweinitz (Philadelphia) reported a case of toxic amblyopia occurring in a man of 60, who smoked to excess and drank moderately. He

was advised to stop the use of tobacco and given strychnia ; but practically he did not give up tobacco until his final illness. The fields of vision presented typical central scotomata. He died of pneumonia with uræmic symptoms. The microscopic examination of the optic nerves showed extensive typical atrophy of the macular bundle.

Impairment of Central Vision following Prolonged Use of the Eye.—Dr. S. Theobald (Baltimore) reported the case of a man, aged 30, who, after prolonged work at "calibrating burettes," just after recovering from an attack of influenza, found that the vision in the right eye had become markedly impaired. Errors of refraction were excluded, and there was no ophthalmoscopic change. The field of vision showed paracentral scotoma. Vision slowly returned to normal.

Optic Atrophy from Sexual Excesses.—Dr. J. A. Spalding (Portland, Me.), reported four cases occurring in boys of about 16, where well-marked double progressive optic atrophy with great impairment of central vision had followed immoderate sexual indulgence. Careful investigation seemed to show freedom from hereditary disease or syphilis, and no considerable use of tobacco or alcohol. In spite of prolonged and energetic treatment, including the use of commonly recognised remedies, the atrophy had progressed until useful vision was permanently lost.

Ophthalmic Changes in Anæmia.—Dr. C. A. Oliver (Philadelphia), reported a series of cases, and showed coloured sketches representing the ophthalmoscopic changes, and charts of the field of vision.

The first case was that of a girl, aged 17, affected with chlorosis. The red corpuscles were diminished to less than one-third of normal, with great lessening of hæmoglobin. There was marked neuro-retinitis, which subsided with restoration of the blood under the administration of iron.

The second case was one of anæmia, attending a neoplasm in a middle-aged woman. The ophthalmic changes were such as occur in pernicious anæmia.

The third case was one of pernicious anæmia, attended with changes of the fundus.

The fourth was also a case of pernicious anæmia, the red corpuscles being reduced to $\frac{1}{20}$th of the normal before death. The ophthalmoscopic changes were characteristic, and the microscopic examination of retina and nerve showed œdema and numerous hæmorrhages in the fibre layer and between the ganglion cells. The blood vessels were normal.

The fifth case was also one of pernicious anæmia, with lowering of the red corpuscles to $\frac{1}{5}$th of normal before death. The fundi showed numerous hæmorrhages, and the arteries were extremely pale.

The sixth case was one of splenic leucocythemia in a man, aged 44, with characteristic changes in the fundus.

Instruments and Specimens.—Dr. John Green (St. Louis), exhibited a watercoloured sketch of a case of embolism of the central artery of the retina, the region between the disc and the macula appearing normal.

Dr. R. Murdoch (Baltimore), gave a practical demonstration of the working of Reid's ophthalmometer.

Dr. Green showed a form of the electro-magnet.

Dr. C. H. Williams (Boston), exhibited an instrument for determining the axis of a cylinder ; also an apparatus for testing the colour vision of railway employes by light transmitted through coloured glasses.

Standards of Form required in Railway Service.— Dr. Williams also read a paper on this subject. He urged that $\frac{20}{20}$ths in each eye without glasses should be required of all persons seeking employment as engine-men or firemen.

Periodical re-examination of the form-vision should be required every three years ; and similar re-examinations before promotion or after serious illness or injury. He believed more could be accomplished by simply showing the officials of the railroads that such examinations were for their own interest, than through legislation.

THE HYPODERMIC USE OF PILOCARPINE ALONE, AND ASSOCIATED WITH OTHER MEDICINES IN THE TREATMENT OF CERTAIN AFFECTIONS OF THE EYE.[1]

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I.—I SHALL begin this paper by giving a very brief summary of one case of rheumatic affection of the eyes, one of acquired syphilitic irido-cyclitis, and one of gonorrhœal irido-cyclitis, so that we may have placed before us some of the data upon which I have based my conclusions.

I may here observe that it is solely with the treatment of these diseases that I am dealing :—

Robert M., aged 48 years, was sent to me by Dr. Tucker, Orono, in the year 1890. The general condition was that of chronic articular rheumatism, and so much crippled was he that he walked into my consulting room with difficulty, leaning on two stout sticks. Exposure seemed to be the chief cause of the disease. The condition of the eyes was very grave. The centre of each cornea was thickly studded with small closely placed infiltrations, occupying a space larger than the pupillary area, but having a rim of clear cornea. In the left eye these infiltrations were

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22

Ophth. Review. Vol. XVI., No. 191, September, 1897.

undergoing undoubted calcareous degeneration. There was an iritic adhesion in one eye. Vitreous slightly hazy ; no change in either fundus. R. eye : vision, a few letters of Snellen type for distance, No. xx. at six inches; and L., a few letters of No. xv. of the same type at six inches. He could not even guess the time on looking at the face of a watch with big figures and hands. The eyes first became affected three years prior to consulting me, and during this time there had been inflammatory attacks, with subsequent deterioration of sight. He had been under the care of specialists, and though given very careful local and general treatment, the eyes had steadily gone from bad to worse. Iridectomy had been advised.

On putting himself under my care I at once began the hypodermic use of pilocarpine. He seemed to have received every form of treatment save this.

To begin with I used it every day for three weeks, the dose varying from gr. $\frac{1}{12}$ to gr. $\frac{1}{4}$ and a few times it was even larger. At the end of this period he could easily make out the time by an ordinary watch. He returned every six to eight weeks, and received each time seven to ten injections. From the beginning of the treatment there was an uninterrupted improvement, both as to the eyes and the general condition. Every six to eight weeks during 1890, 1891, 1892, 1893 and 1894 these injections were given. The vision gradually improved till in 1895 it was $\frac{20}{50}$. In April, 1895, an interval of almost one year, during which no treatment was carried out, his sight re mained the same. The vision is now—that is one year ago, when last seen—$\frac{20}{50}$. He is now very active, and can run up and down ladders with great ease and quickness.

The hypodermic injections of pilocarpine were discon tinued as he could not attend any longer, and besides saw and felt so well that he was contented.

In his case the cornea did not further clear up after the cessation of the use of pilocarpine. I have observed that as long as an improvement is produced by the pilocarpine its use must be maintained if the improvement is to be continued ; otherwise, with the cessation of its use, there

is no longer any improvement. This non-progress does not mean relapse, it only means the progress established goes no further. This rule has, of course, exceptions, but my experience teaches me that in the main it is adhered to.

I shall now mention the case of syphilitic affection of both eyes treated by mercury and iodide of potash given internally and pilocarpine hypodermically.

II.[1]—July, 1894, a man, aged 30 years, was sent to me, suffering from acquired syphilitic inflammation of both eyes of at least nine months' standing. The treatment of the eyes during this period had been by mercury and iodide of potash internally, and atropine locally. However, the eyes had steadily got worse, till when I saw him the condition was as follows:—

Left eye: much conjunctival and ciliary injection, pain at times, aqueous turbid, many lymph dots on the posterior surface of the cornea, very many posterior synechiæ, some being broad and dense with the deposit of a membrane of lymph in the pupillary area; V. = p. l. only.

Right eye: letters of No. xl. of Snellen type for distance at eight inches: cornea and aqueous very slightly affected, if at all; posterior synechiæ more numerous and broader, so as to be almost without a break, i.e., so as to form almost one solid ring of adhesions, and the lymph deposit in the pupillary area thicker. I continued the mercury and the iodide. At the end of five weeks no improvement had taken place—in fact the eyes were worse.

I now made a change in the treatment, as follows. I still continued the internal use of mercury and the iodide of potash, and added pilocarpine, giving it hypodermically. This treatment was kept up for nine months, and the result at the end of that time was: right eye = $\frac{20}{40}$ and left eye = $\frac{20}{20}$. The deposit of lymph once markedly present in the pupillary areas seemed to be practically gone in the left eye, and much lessened in the right; and

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[1] *Archives of Ophthalmology*, vol. xxiv., No. 3, 1895.

of the posterior synechiæ, some had given way, others had become so thinned that persistence in treatment was, I believe, only needed to cause all of them to snap asunder.

This case, I hold, has made manifest the superiority and value of the combined form of treatment, *i.e.*, of mercury and iodide of potash internally, and pilocarpine hypodermically, over the ordinary routine of mercury and the iodide of potash.

III.—My third case was one of very severe gonorrhœal irido-cyclitis, with p. l. only : aqueous hazy, and many posterior synechiæ with exudation of lymph into the pupillary areas. Here atropine and leeching locally, with mercury and potassium iodide internally were used with benefit for ten days. Then there was a return of the severe pain, and the pupils which had dilated partially and irregularly, began apparently to contract, an appearance due to the presence of active inflammation of the ciliary region. I now added pilocarpine, giving it hypodermically, to the treatment, with immediate and marked benefit. The vision finally became $\frac{6}{9}$ correctly, though mistily, which latter condition was due to the thin lymph still lingering in the pupillary areas. This only requires further treatment to be fully removed. This, however, he has not as yet returned to receive.

From the foregoing brief account, and after careful observations upon the effect of the treatment, continued over seven years, I feel that I am justified in drawing favourable conclusions as follows :—The first case narrated—and I have others of a like nature which strengthen my opinion—clearly shows, I think, the great and lasting benefit of the persistent use of pilocarpine given hypodermically in long-standing rheumatic disease of the eyes, and incidentally in the general rheumatic condition. I think that in this case the addition of the internal use of medicine would have been beneficial, but none was given.

The second brings markedly to our notice the

brilliant and rapid improvement through the addition of pilocarpine used hypodermically. Here we see the gradual removal of long-standing and organised exudation, a most important and significant result. I wish also to draw your attention to the permanence of the curative effect ; for never since the use of the combined form of treatment has there been any relapse.

The case of gonorrhœal irido-cyclitis, which under ordinary treatment would have, at the best, left the vision much impaired, showed under the combined treatment immediate improvement ; and I am confident that by persistence in the treatment normal vision would have resulted through the removal of the exudation.

My method of administration is as follows :—The mercury I give in the form of pulv. hyd. cum creta and pulv. Doveri made into pill mass and put into capsules. This is given before eating, and the iodide after eating. My procedure regarding the pilocarpine is as follows :—I give it in the afternoon and keep the patient in the house afterwards, not allowing him to leave it till the next day, when in suitable cases he can go out and take exercise, sometimes even follow his occupation. Just prior to giving the injection he is put to bed, lying between flannel sheets and dressed in a flannel suit. The temperature of the room is about 75°.

The covering over him is a blanket well tucked in. In a few cases where, under the influence of the drug, the feet become cold, I place a warm bottle to them. The patient also holds to his mouth a large cup to catch the saliva that flows freely. The solution is pilocarpine muriat. gr. v. aq. destill. ʒi., *i.e.*, gr. $\frac{1}{4}$ to ♏iii. It is injected into the forearm, and the amount being small in quantity makes the subsequent tender-

ness very slight. He remains in bed for one and a-half to two hours, and, on getting up, is wiped down with warm towels, and is then free to go about the house, but not to go out till, in suitable cases, the following morning.

Eight weeks I have found clinically to be the longest interval between each group of injections that can be profitably allowed, and three weeks the shortest. But this latter interval is only made use of in the beginning of the treatment. Later on the interval is extended to six or eight weeks. It is very necessary, indeed, not to cause intolerance of the drug, but at the same time important to use it as fully as it can be borne. In retinal and retino-choroidal affections I feel that the combined method will be found in a certain proportion of cases to be more reliable and satisfactory in its results than the remedial measures now used.

In a few cases of optic neuritis, with copious exudation, it has seemed to accelerate absorption. The action of pilocarpine appears chiefly to be upon the nervous and absorbent systems, and hence the intensifying of the action of other medicines when it is associated with them ; and also the necessity of a careful routine such as I have indicated during its administration.

The combined form of treatment, having been found so useful in the diseases of the eye above mentioned, should be of equal value in the treatment of other parts or organs of the body that may become affected by the same diseases, and where what may be termed the usual remedies have failed to be of service.

However, there is one intractable affection of the eye in which I have not had the opportunity to try the combined treatment, i.e., sympathetic ophthalmitis. I have a feeling that it should be of signal benefit in this disease. My own faith in this combined form of treatment is now so established by reason of its

uniform success that I consider myself justified in recommending it with confidence to the favourable consideration of the members of the medical profession.

In the discussion which followed the reading of Dr. Burnham's paper, Dr. FRYER confirmed the experience of the writer with regard to the use of pilocarpine in promoting absorption. He had not used it as generally in syphilitic cases as Dr. Burnham had, but he had used it very frequently and in a number of different diseases, *e.g.*, hæmorrhages in the retina and sympathetic ophthalmia. He knew no drug which so effectually produced the absorption not only of recent exudations, but of old standing ones. He began with a small dose and gradually worked up till in some instances he had given as much as a grain. He generally gave a small quantity of alcohol at the same time. He found that individuals differ very materially as to what set of glands are stimulated by the drug. It was very important in using the drug to keep the patient absolutely quiet and in bed. He had had a number of instances of absorption of vitreous opacities that had lasted over a year, and had seen great diminution of the exudations in sympathetic ophthalmitis.

Dr. ALT had had a number of rather disagreeable experiences in the use of pilocarpine, particularly in the way of heart failure, which had deterred him to some extent from as liberal a use of it as he had formerly been accustomed to. The absorption of old vitreous opacities had not been so successful in his hands as in those of the two previous speakers. He had had a considerable number of cases which were treated for a continual period of time with the pilocarpine injections, in which the opacities did not clear up, where afterwards he had obtained good results with the use of corrosive sublimate. He preferred the old treatment.

Dr. MITTENDORF had come to look upon this drug as one of his chief resources in chronic cases of opacities, especially when associated with detachment of the retina, and he had given it in very small doses continued for a long time.

Dr. WILLIAMS emphasised the importance of having fresh solutions—thoroughly sterilised—made in each subcutaneous injection.

Dr. BURNHAM in his reply said : I am very glad indeed to have heard Dr. Fryer's remarks regarding sympathetic ophthalmia, and that he has found pilocarpine so useful as a curative agent in that disease. I have not had any experience regarding it. The reason I gave my routine rather in detail was that I consider the routine in regard to the administration of pilocarpine exceedingly important, and if it be deviated from at all, you have a decided lessening of the effect, and you have increased and exceedingly alarming nervous symptoms. With regard to the alcoholic stimulant, I give none. I have never given a dose of one grain. I did at one time state that I had given half a grain, but subsequently I became convinced that my hypodermic syringe was at fault, and that there must have been a leakage somewhere. I now use a syringe with which I can gauge exceedingly accurately, and I watch very closely that I lose not an atom of moisture. Half a grain is a dose that I have not given for years, and a whole grain I have never thought of giving because my experience teaches me that it would be exceedingly dangerous.

If the flow of saliva is slight and the perspiration only moderate, if these two things occur in any one case, I feel that the pilocarpine has been maladministered in some way or another. There may be exceptional cases, of course. Women are more easily affected by pilocarpine than men. With regard to the posture in bed, it is necessary to let the patients lie with their head on a thin pillow and make them keep a mug under the clothes. You must keep them thoroughly covered, because they feel the effect of the slightest breeze—they feel it keenly, and it has a very bad effect upon them. Their nervous system is aroused into such intense activity that they suffer extremely, and you get this heart trouble and signs of nervous depression of various kinds which would otherwise be avoided. Therefore I make them lie almost flat in the bed and stay there for at least two hours, and when they get up

they must be at once rubbed down with warm towels. I let them go out the next day and take exercise. With reference to Dr. Alt's remark about heart failure, I am convinced that if the dose I speak of be administered carefully, if the posture I speak of is adhered to, and the routine I recommend fully followed out, he will avoid it unless it be in exceptional cases. I have only had one case in which I had to stop the pilocarpine, and before I began I thought it very likely that it would soon be necessary to give it up. In rheumatic cases, especially, one sees the benefit of continuing the treatment for a number of years.

What I wish to insist upon is the combined form of treatment, that is, its use in connection with other remedies—I have spoken only of mercury and iodide of potash—but when one gets a case of long-continued disease with copious exudation, and sees this becoming thinner and thinner, and one little band after another snap until finally the whole film goes, one is naturally impressed with the marvellous effect of the drug upon the tissues.

I always put my needle into a one-twentieth solution of carbolic acid before putting it into the skin, and I have never had resulting abscess and scarcely any soreness, and moreover I have used the same forearm for seven to ten injections. I have now a case under treatment in which it was said that the man had been treated with pilocarpine, but it was given in such a really grotesque way as to be absolutely valueless. I used with him the combined treatment with the most satisfactory result.

SUGGESTIONS REGARDING AN ELEMENT IN THE ETIOLOGY OF TRACHOMA.[1]

By George T. Stevens, New York.

In order to follow this discussion it is necessary to start with certain principles respecting the normal planes of vision in relation to certain cranial types. This subject was the theme of a paper which I had the honour to read at the recent Meeting of the American Medical Association,[2] and I need, therefore, only recall, without discussing, the principles there announced, and which for the purposes of this paper I shall assume to have been demonstrated.

The principles are briefly these, the rules being very general but not universal :

(1) With the type of skull known to craniologists as the "long skull," the dolicho-cephalic, especially if the angle made by the three points, the glabella, the sub-nasal fossa, and the point of the chin is high, the axis of the orbit is directed downwards, its depression averaging about 10° below the horizon and the direction of the visual lines, when the head is in the primary position and the minimum of nervous energy is directed to the eye muscles, is correspondingly downwards.

(2) With the "broad skull," the brachy-cephalic, the angle formed by the points already mentioned being either very low or negative, the axis of the orbit is also depressed but to a less extent than in the case of the

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[1] Read before the Ophthalmic Section of the British Medical Association held at Montreal, August-September, 1897.

[2] Published in *Archives of Ophthalmology*, July, 1897.

long skull, and here, too, the normal direction of the
visual lines is downwards but less depressed than in
the case of the former type.

(3) In the " medium skull " (the meso-cephalic), in
which the transverse diameter is greater in proportion
to the length than in the long skull, but less in propor-
tion to the length than in the broad skull, but in general,
with the proportion of the height of the skull to the
length greater than in either of the other types, the
axis of the orbits has a direction very materially higher
on the average than in either of the other types and
here in very many cases the axis points many degrees
above the horizon. The visual lines with this type of
skull are normally directed above the plane of the
horizon to the extent that, if we compare the rotation
in the vertical directions of the eyes of a number of
persons whose heads belong to the dolicho-cephalic
type with the corresponding rotation of a number of
persons of the meso-cephalic type, the result shows
that the people with the long heads have an average
restriction of the upward rotation of the eyes, and the
people with the meso-cephalic heads an average excess
of upward rotation, and that if fifty or more of each
type were to be examined by the tropometer an average
difference of at least 15° of arc would be found between
the upward rotation in the two types, the long heads
having the least, and the medium or tall heads having
the greatest rotation up.

With these varying directions of the normal plane of
vision there arise certain adjustments of the muscles
of the head and face which are so habitual that they
become characteristic for the types to which they
belong. Thus, with the normal depression of the
visual plane (the condition which I have called kato-
phoria), common with the long head and prognathous
face, there is a characteristic elevation of the chin
while walking, and, what is especially apposite to our

present purpose, the upper eyelids are prominently exposed and loosely applied to the surface of the eyeball.

On the other hand, with the normal elevation of the visual plane above the horizon (the condition which I have called anophoria), a condition common with the tall head and orthagnathous face, the forehead is carried in advance of the face while walking, the brow is strongly contracted, and presses upon the upper lids which are nearly concealed.

This compression of the brows and pressure of the lids upon the upper surface of the eye-ball are the auxiliary forces which are instinctively brought to bear to aid the proper depressor muscles of the eyes in performing the function of directing the visual lines downwards, the direction they must usually maintain.

This pressure of the upper lids in many cases of anophoria becomes extreme.

It is this severe pressure of the lids upon the eye-ball in cases of anophoria which appears to me to be an essential element in the production of trachoma.

During the past two years, in which time I have been accustomed to test nearly all eye patients by the tropometer, I have found no exception to the rule that with trachoma of the upper lids there is anophoria of a high degree, and in every case of unilateral trachoma of an upper lid, of which during that time I have seen several, there has been hyperphoria. That is to say that in all cases of upper lid trachoma it has been found that the eyes are normally adjusted for a plane much higher than that which has been found to be the most favourable, and that in unilateral trachoma not only are both eyes thus affected but one is adjusted higher than the other.

The presence of trachoma in anophoria, and its entire absence in cases of katophoria, if observations were confined to a small number of persons, might

be suggestive without affording sufficient proof that the troublesome affection does occur with anophoria and does not occur with katophoria.

Fortunately we have some data by which we can carry our observations beyond the limits of the experiences of any one individual.

During the last few years several American writers, Dr. Burnett and others, have laid much stress upon the fact that in their experience there has been a conspicuous absence of trachoma among the negroes, and, while they have not made the statement in set terms, they have implied that in their belief there is some quality in the blood or the tissues of the negro which renders him immune from this form of disease. That it is true that the negroes in the United States are notably less subject to trachoma than are the whites, and especially the whites originating from certain nationalities, under corresponding circumstances, is not to be doubted. The testimony of many trustworthy witnesses has established the proposition.

On the other hand, Dr. Van Millingen, of Constantinople,[1] instituted about two years ago an inquiry in which he collected the views and experiences of many correspondents stationed in different parts of the world, and from the various replies to his questions he was led to the conclusion that " all races are equally susceptible to the virus of trachoma," and that " immunity for certain races does not exist." In his own practice in Constantinople he had found trachoma rife among the negroes who came to his clinic.

Concerning these two apparently conflicting conclusions a careful examination of the data furnished both by the American writers and by the letters in

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[1] " The Statistics of Trachoma,"*Annales d'Oculistique*," September, 1895.

Dr. Van Millingen's inquiry will show that both are to a certain extent right, and it will be seen that among peoples with the dolicho-cephalic, or with the brachy-cephalic head, there is immunity from trachoma ; while among the peoples with the meso-cephalic head, especially where the head is markedly high in proportion to the length, trachoma is endemic. Thus, for example, it will be found that in Bavaria, where the original stock is characterised by the marked brachy-cephalic type of head, and therefore with the visual plane normally depressed, trachoma is only known as a sporadic affection, brought generally by those who come from beyond the limits of the country. Thus Michel, ·writing from Wurzburg, Bavaria, in the centre of a district in which the brachy-cephalic head is the characteristic type, says :—

" Trachoma does not exist in the endemic form either at Wurzburg or in the neighbourhood near or more distant (North Baden, North Würtemberg, Lower or Middle Franconia)."

Professor Haab, also, writing from Zurich in the Alpine region, known to ethnologists as the home of one of the most extreme of the brachy-cephalic races, says : " In my field of observation (Eastern Switzerland) I see no cases of trachoma."

Other examples might be cited, but we pass to the testimony of those in regions inhabited largely by peoples with the extreme meso-cephalic head, and therefore with the plane of vision normally directed above the horizon, and we find Dr. Gossetti, of Milan, stating that " more than a third of the eye diseases are cases of trachoma." Other Italian physicians give similar testimony. From London, Dr. Sydney Stephenson writes that in Great Britain, with the exception of Ireland, trachoma is very rare. When we recall the fact that the people of Great Britain are the resultant of a series of crossings, that according to the testimony

of ethnologists the average cephalic index of English-
men is 76·1, thus placing the English people in the
sub-dolicho-cephalic class, and when we also consider
that the Irish race is nearly pure, and that the Irish
people, especially the natives of the South of Ireland,
are characterised by a type of head belonging to the
meso-cephalic class, an explanation of the exception
made by Dr. Stephenson, which is familiar to all, is
at hand.

Thus reviewing the testimony of experts from dif-
ferent lands, we find that wherever the meso-cephalic
type of cranium prevails, trachoma also prevails, and
that among the peoples with long or broad skulls, and
with consequent depression of the normal plane of
vision, trachoma is either unknown or exists in a
sporadic form.

Among the negroes of the southern part of the
United States, whose ancestors came mostly from the
west coast of Africa, and who are characterised by the
extreme dolicho-cephalic head and a high degree of
prognathism, there is a remarkable immunity as the
uniform testimony of oculists shows.

On the other hand, the negroes of Constantinople,
a large proportion of whose ancestors were brought
from Central and South Africa, and who have high
meso-cephalic heads and straight faces, and who
show the heavy lower jaw and compressed brow as
notably as the typical Irishman, are, according to Van
Millingen, as much predisposed to trachoma as the
Irishman himself.

It is therefore something more than an interesting
coincidence that the peoples in whom the characteristic
features of the meso-cephalic head are most marked,
as, for example, the Irish, the Italians, and the Japanese,
are those who are by far the most susceptible to tra-
choma, while in certain parts of Germany, notably in
Bavaria, where the prevailing type of head is the

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brachy-cephalic, trachoma, according to the testimony of Bavarian surgeons, is not known as an endemic disease, and among the dolicho-cephalic negroes of the United States there is a practical immunity.

Now if to the pressure of the lids upon the eye-ball in anophoria, there is added an environment of dust, and to that the indifferent nutrition incident to poor and insufficient food, we have the most important elements for the production and increase of trachoma. That neither the condition of an environment of dust nor the indifferent nutrition of the poor are essential elements in the causation of trachoma is shown by many notable examples.

With the question of a specific germ for the affection or the question of contagion we are not now concerned. If there is a specific germ or a contagion it finds no favourable soil for its development in the absence of anophoria.

Has this view of anophoria as an essential element in the etiology of trachoma a practical side ? Most decidedly. Although engaged only in private practice where one sees few of the more extravagant cases of trachoma, my experience during the past two years enables me to say that a change of the direction of the visual plane by bringing it to correspond with that of the horizon, brings notable, and in some cases very remarkable, relief to the trachomatous condition. Indeed, a number of cases of well-marked trachoma which have resisted the ordinary modes of treatment for years, have practically recovered within a few weeks after carefully executed corrections of the anophoric tendency without any important auxiliary treatment.

To recapitulate :—

(1) During two years of careful examination I have found no case of trachoma in which the condition of anophoria did not exist.

(2) Nationalities in which the form of the head indi-

cates a prevalence of anophoria are especially subject to trachoma.

(3) Nationalities in which the dolico-cephalic or the brachy-cephalic head is the predominant type, and in which the direction of the visual plane is that of kato-phoria, are comparatively immune from trachoma.

(4) Relief to the condition of anophoria by bringing the normal visual plane to a more favourable position is habitually followed by the most gratifying improvement in the trachomatous condition.

ALBUMINURIC RETINITIS.

By J. W. H. EYRE, M.D.

SENIOR OPHTHALMIC ASSISTANT TO GUY'S HOSPITAL.

RETINITIS as a complication of Bright's disease is variously estimated to occur in from 10 to 20 per cent. of the cases, and undoubtedly the majority of them are chronic in character as far as the renal condition is concerned. Indeed, Gowers [1] goes the length of saying that " albuminuric retinitis is met with *only* in chronic forms of Bright's disease " ; whilst in a recent paper upon the subject in the *Guy's Hospital Reports* [2] the following passage occurs :—" It has been suggested that the retinal changes may sometimes precede the kidney affection, but such cases are probably examples of granular kidney, in which

[1] " Medical Ophthalmoscopy." Gowers.
[2] " Albuminuric Retinitis." Sutton.—*Guy's Hospital Reports*, vol. iii., 1896.

albumen is absent or only present to a very small extent till a later stage of the kidney affection."

In view of these statements a report embodying the clinical features and urinalysis of two cases of albuminuric retinitis where the retinal trouble was absolutely the first indication of the renal affection and preceded the albuminuria by an appreciable time, possesses some points of unusual interest.[1]

That such cases did occur I have long suspected, but it is only recently that the chain of evidence has been completed, the great difficulty indicated in the quotation from Dr. Sutton's paper being the fact that albumen may be absent from the urine of cases of chronic renal disease, especially of the interstitial variety, for longer or shorter intervals, and that during these periods renal tube casts may or may not be observed in the urine.

Another well-recognised fact by those who are in the habit of making any considerable number of examinations of urinary deposits, and one which has a distinct bearing upon the following cases, is that it is not unusual for the appearance of renal tube casts to precede by some days that of albumen in the urine of cases of acute kidney mischief.

Of the cases here described the first quoted is one in which the clinical history no less than the *post-mortem* appearances points definitely and distinctly to an acute nephritis, and yet in this case the retinitis was the first and for some days at least the only evidence of any kidney lesion, and I take it against this particular case none of the above-mentioned arguments are tenable.

With regard to the second case objections may be raised, but the only theory which would carry any

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[1] Mr. Hopkins, in the section of the Report of the Clinical Research Association (1896) dealing with urinalysis, mentions similar cases which have come under his observation.

weight would be that which assumed an acute attack occurring in a kidney already the seat of a chronic nephritis, and that the retinitis was present as a sequel of the latter and not as an antecedent of the former.

Case 1.—G. C., male, aged 50, first seen May 20. Patient was then complaining of dimness of vision, slight headache, and general malaise, of three days' duration. History was that he had got wet through when return- ing from the city about a week ago. Personal medical history good; no previous illness except whooping cough when a child, and gonorrhœa at the age of 20. Beyond some slight puffiness under the eyes nothing could be made out by an ordinary physical examination.

Urine acid, sp. gr. 1008, blood, albumen, and sugar absent. No tube casts could be detected in the centri- fugalised deposit.

On examining the eyes, the vision was found to be $\frac{6}{36}$ in the right and $\frac{6}{12}$ in the left. No improvement with lenses.

Ophthalmoscopic examination of the fundus of the right eye showed that the disc was somewhat swollen and its outline blurred, the arteries engorged, the veins tortuous and pulsating. The macula was completely surrounded by numerous minute yellowish-white dots and striæ, and the interval between the macula and the papilla was occupied by some small flame-shaped retinal hæmor- rhages.

The condition of the left fundus was similar to that of the right, but much less marked.

From the ophthalmoscopic appearances albuminuric retinitis was diagnosed, and the patient placed under the care of his medical attendant. The daily output of urine was carefully collected, measured, and examined chemi- cally. About two ounces of the "twenty-four hours' sample" were centrifugalised and the resulting deposit examined microscopically for tube casts. On May 30 a few granular tube casts were found in the deposit, but albumen was still absent and was not detected in the urine until June 3, its appearance coinciding with a sudden

drop in the total quantity of urine passed in the twenty-four hours to twenty ounces. By this time vision had fallen to less than $\frac{6}{60}$ in the right and $\frac{6}{36}$ in the left eye; and with the ophthalmoscope the swelling of the left disc was seen to have increased. The patient's general condition now became very serious. The headache was continuous and accompanied by giddiness; there was a good deal of anasarca of the lower extremities, the heart was irregular in its action and the second sound was accentuated. About the middle of July uræmia supervened, and death quickly followed.

Post-mortem each kidney was found to be swollen, rounded and elastic (weighing respectively 6·5 and 6 ounces); the capsule, non-adherent, stripped readily. The cortex, on section, was considerably swollen and somewhat lighter in colour than the pyramids, which were deep red and dripping with dark blood—a typical picture of acute Bright's disease.

A few extracts from the urine chart of this case are appended.

URINE CHART.

Date.	No. of oz. in 24 hours.	Sp. gr.	Reaction.	Albu-men.	Urea.	Microscopical Examination of the Centrifugalised Deposit.
				%	%	
20/5	...	1008	Acid	*Nil*	..	*Nil.*
27/5	40	1019	Acid	*Nil*	2	*Nil.*
30/5	35	1010	Acid	*Nil*	2	Few granular tube casts.
3/6	20	1022	Acid	0·3	..	Few granular tube casts + hyaline.
10/6	28	1019	Acid	3·0	3	Epithelial granular and hyaline casts, blood discs and excess of leucocytes.
17/6	20	1019	Acid	3·0	3	Epithelial granular and hyaline casts, blood discs and excess of leucocytes.
24/6	25	1020	Acid	6·0	2	Epithelial granular and hyaline casts, blood discs and excess of leucocytes.
30/6	20	1028	Acid	10·0	2	Epithelial granular and hyaline casts, blood discs and excess of leucocytes; also blood casts.

Case 2.—A. J., female, aged 37, married. First seen October 27, complaining of rapid failure of sight of seven days' duration. Patient had suffered from frequent headaches since childhood, but they had been much worse and more frequent since her last confinement (a month ago) when she had been delivered of a seven-months' still-born child. The two previous children were born alive and quite healthy. She states that a reddish brown rash appeared over her chest and arms about six months ago, and that she suffered from a bad sore throat at the same time. No previous history of any of the acute specific fevers could be obtained. Physical examination of the chest *nil*.

Urine acid, sp. gr. 1020, blood, albumen, and sugar absent. No casts could be found in the centrifugalised deposit.

Examination of the eyes.—R.E. vision $\frac{6}{36}$, L.E. less than $\frac{6}{60}$. Ophthalmoscopic examination of the right eye showed the disc to be somewhat anæmic and the outline hazy and blurred. The macula was completely encircled by numerous fine yellowish radiating striæ, and a few small hæmorrhages were noted just below the disc. The fundus of the left eye showed similar appearances, but the hæmorrhages were larger and more numerous. By retinoscopy the patient was found to have marked myopic astigmatism, but even with the correcting lenses (—1·5 D. cyl., axis 120°) the vision remained unimproved.

The patient was sent back to her family medical man, and observations as complete as those detailed in the previous case undertaken. The urine appeared to be perfectly normal until November 7, when hyaline tube casts were detected in the deposit for the first time, and upon this date a large retinal hæmorrhage situated midway between the disc and the macula was noted. Some of the usually observed symptoms of a nephritis now made their appearance, the lax connective tissue below the eyes became œdematous, the feet were somewhat swollen, and so on. The patient's condition grew more serious, the pulse was hard and splashing, the heart sound

lengthened, the anasarca pronounced; the urine contained albumen in rapidly increasing quantity, also granular and epithelial tube casts and blood cells.

Vision fell to fingers at three metres in the right eye and at one metre with the left.

Complete rest and appropriate treatment persevered in for a considerable time resulted in the complete convalescence of the patient. *Pari passu* with her return to health the striæ faded and (?) became absorbed ; the discs cleared, although remaining whiter than normal. Vision also improved, and with correcting lenses was $\frac{6}{18}$ in the right and $\frac{6}{24}$ in the left eye. When leaving England a few months ago, the patient reported herself as feeling perfectly well and free from headache. The urine generally contains a few hyaline tube casts and perhaps an occasional granular one, while the albumen amounts to a minute trace only.

URINE CHART.

Date.	No. of ozs. in 24 hours.	Sp. gr.	Reaction.	Albumen.	Microscopical Examination of the Centrifugalised Deposit.
				$^o/_o$	
27/10	...	1020	Acid	*Nil*	*Nil.*
4/11	55	1016	Acid	*Nil*	*Nil.*
7/11	45	1020	Acid	*Nil*	Hyaline tube casts.
11/11	50	1022	Acid	Trace	Granular and hyaline tube casts.
30/12	45	1022	Acid	Trace	Ditto.
6/1	22	1026	Acid	Good trace.	Ditto.
20/1	18	1026	Acid	0·2	Ditto.
9/2	24	1018	Neutral	0·4	Granular, hyaline, epithelial and blood casts.
18/2	21	1022	Acid	1·2	Ditto.
18/3	40	1020	Acid	0·4	Granular and hyaline tube casts.

The following, too, may be quoted as an example of that class of case occasionally—I had almost written frequently—met with in out-patient practice, where the eye trouble is the first symptom to which attention is attracted, but where there is a possibility that the kidney mischief had previously existed, perhaps for

some time. And these are just the cases where the opportunities of an inspection are few.

J. C., male, aged 47, first seen May 28, complaining of loss of sight of the left eye of seven days' duration. Beyond the fact that the patient was somewhat anæmic, nothing of importance could be elicited by physical examination.

Urine neutral, sp. gr. 1012, blood, albumen and sugar absent. No tube casts could be detected in the centrifugalised deposit.

Vision of R.E. $\frac{6}{12}$, L.E. $\frac{6}{24}$. Ophthalmoscopic examination of the right eye showed a normal fundus, that of the left showed the presence of a large number of minute whitish dots scattered around the macula, also three small hæmorrhages immediately below the papilla, and a smal floating opacity in the vitreous. A few days later similar dots were visible round the macula of the right eye, the vision of which had fallen to $\frac{6}{18}$.

On June 2 some hyaline tube casts were noted in the centrifugalised deposit from the urine, and on the 19th epithelial and granular casts were present, and a trace of albumen was demonstrated by chemical means. The condition of the patient was apparently the same up till July 31, when he transferred his attendance to the medical out-patient department, where the diagnosis of early parenchymatous nephritis was recorded.

URINE CHART.

Date.	Sp. gr.	Reaction.	Albumen.	Urea.	Microscopical Examination of the centrifugalised deposit.
			%	%	
28 5	1012	Neutral	*Nil*	3·48	*Nil.*
2 6	1022	Acid	*Nil*	3·48	Hyaline tube casts, excess of leucocytes.
19 6	1020	Acid	Minute trace	3·2	Hyaline granular and epithelial tube casts.
25/7	1010	Acid	Trace	...	Ditto.
31/7	1015	Acid	Good trace	...	Hyaline and granular tube casts.

NOTES ON THE "MULES' OPERATION," VERSUS EVISCERATION.[1]

By F. Buller, M.D., Montreal.

Since the year 1885 I have performed the operation of evisceration, with insertion of an artificial vitreous a great many times, following for some years, as nearly as possible the plan of operation recommended by Mr. Mules (*vide Transactions of the Ophthalmological Society of Great Britain*, vol. v., p. 200), but the results were not altogether satisfactory.

The reaction was often intense, and I am under the impression that the glass globe was subsequently extruded in about one case in three. This was apparently caused by the impossibility of maintaining asepsis during the healing process, due I think to three causes ; (1) the circular aperture in the sclera could not be brought into perfect coaptation ; (2) the cat-gut sutures were not sufficiently lasting ; (3) there was no efficient means of preventing the conjunctival secretions from reaching the imperfectly closed wound. Reasoning thus I was led to modify the *technique* of the operation in the following manner.

(1) Dissection of the conjunctiva for some distance round the cornea.

(2) Removal of the cornea with a triangular portion of the sclerotic above and below. This large vertical aperture in the sclera permits a more perfect inspection of its interior, and facilitates the entire removal of its

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Read at the meeting of the British Medical Association, held at Montreal, August-September, 1897.

contents, and the glass globe can always be inserted without further enlargement of the aperture.

(3) The scleral wound after insertion of the globe is united by five or six white China silk sutures, size o.o., and these are cut short and allowed to remain. They are inserted through the entire thickness of the sclerotic about one millimetre from the margin. This secures a perfect and permanent coaptation of the scleral edges.

(4) Three or four black silk sutures (size No. 1) unite the conjunctival aperture in a horizontal direction.

Thorough asepsis before, during and after the operation is absolutely essential to secure uniform success.

Some hours before the operation the face is thoroughly cleansed with soap and warm water and with a solution of perchloride of mercury, 1 in 2,000 ; the conjunctiva with 3 per cent. warm solution of boracic acid. The closed lids are then bandaged with a dressing of absorbent cotton freely dusted with fine boracic acid powder. The same cleansing process is repeated before the operation. The contents of the sclerotic are always removed with a Volkman's spoon and the cavity scraped clean with the same, and freely flushed with the perchloride solution 1 in 2,000.

Solutions of the perchloride 1 in 1,000 irritate the conjunctiva more than is desirable ; the weaker solution is therefore to be preferred. I do not wait for all bleeding to cease before inserting the globe, as it is not at all necessary, and prolongs the operation very much.

When all the stitches have been inserted the conjunctiva is thoroughly cleansed with boracic acid solution and the stump dusted with iodoform powder. An absorbent cotton compress dusted with the same and a compressure bandage complete the dressing.

This dressing is not removed before 48 hours. If there is then much reaction, swelling and pain, I use

ice-cold perchloride compresses, frequently changed, for two or three days. If not, the eye is cleansed with boracic acid solution and dressed as before, once daily.

In from five to seven days the patient is practically well.

The records of the last ten cases treated in this way show that nine were perfectly successful. One failed, but in this case I was not surprised at my non-success. It was a small shrunken eye and no glass globe could be obtained nearly small enough ; a large gold bead was used instead, and even with this the scleral edges could hardly be united. It came out at the end of four weeks.

If the glass globe should unfortunately become extruded, there is still a better stump than that of enucleation.

I have not performed this operation in any case of acute suppuration of the eyeball, or in any case where sympathetic ophthalmia was present or seemed imminent, or in any case of sarcoma of the choroid, and I do not think it advisable where the eyeball is very much shrunken. In all other cases I believe it is very much preferable to enucleation, simple eviscera-tion, or optico-ciliary neurectomy. I used to perform this latter operation occasionally as a substitute for enucleation, but never shall again, since I have once seen it followed, three months later, by total loss of the other eye from sympathetic ophthalmia.

Besides the cosmetic advantage gained by the better stump for wearing an artificial eye, the Mules' operation gives a healthy conjunctiva which is not in the state of chronic irritation from retained secretions so often seen after enucleation, and therefore not so liable to ulceration and cicatricial changes.

Until I discover some good reason for changing my opinion I shall continue to regard this operation with unqualified approval.

In the discussion which followed Dr. Reeves said he had tried, some years ago, in a number of cases of evisceration of the eyeball, to substitute for Mules' operation the plan of allowing the eye to fill with blood and then stitching up the scleral wound. In cases of evisceration he had always stitched the lips of the scleral wound so as to secure a perfect union and prevent the introduction of germs. He would like to refer to another class of case in which there is no suppuration, but where there has been plastic inflammation, and he had found that here the scleritis was prolonged and farther shrinkage of the vitreous occurred, with the result that the artificial globe was extruded. In these cases, particularly in young patients, there was more or less inflammation and a ten- dency to shrinking of the pulpy eye, and for them he thought enucleation preferable to evisceration. In one case he had found Mules' operation of special benefit. One of the house surgeons unfortunately lost his eye while treating a case of gonorrhœal ophthalmia : he was very desirous of having the very best cosmetic result. Mules' operation was performed with the result that he is wearing a glass eye, and few know it.

Dr. Noyes said : I do not think in New York Mules' operation has gained very much following. For myself, personally, I have never done it, and I would not, of course, rise to speak here on that basis of experience only that I may say that I have been deterred from resorting to it because of the statements which I have found in dif- ferent reports that from four to six weeks were necessary for recovery, and that the reaction would be very severe, involving the continuous use of ice water for some days after the operation. Now, Dr. Buller's suggestion of how to secure aseptic conditions is to me extremely interesting, and I shall certainly venture to adopt his method of per- forming the operation. This, however, brings me to state what I think it is only just that I should mention, namely, that I have resorted to another method of proceeding which was reported in the journals a year or two ago, and which I hoped would serve the same purpose as Mules'

operation, and would enable us to dispense with the necessity of having a large number of globes to fit into the cavities according to the size required. A gentleman, whose name I forget, reported some time ago cases where he had introduced into the scleral cavity a piece of aseptic sponge, sewing it in, with the view of obtaining the same result that Mr. Mules has obtained. He described some seven or eight cases, and I was led to follow his example and employed his method of proceeding. I did it last autumn and it was followed by the most protracted and disagreeable suppuration. It took six weeks to two months for the stump to heal, and I had to deal with a very vigorous, healthy, sensible, hard-headed American mechanic, who put up with all the inconvenience and made no complaint. I chose my subject in making my experiment, and I realised that the probable cause of the unpleasant experience was the septic processes which were unavoidable.

Now, perhaps we may put a piece of sponge in the scleral cavity and cover it up, and prevent access of germs to it, and with the piece of sponge secure results similar to those of the glass globe. This gentleman's idea was that the sponge should be assimilated with the tissue and should gain vitality from the surrounding part. But whether this be so or not, I only make the suggestion that possibly the introduction of a piece of sponge combined with Dr. Buller's method of covering, may answer the purpose, where we are unable to secure properly shaped glass globes.

The President :—I have not myself performed this operation to any extent ; as a matter of fact I have only done it once, so I cannot claim to be able to say anything for or against the operation. Some of my colleagues are beginning to do it. I saw Mr. Bickerton, who was unable to come, but just as I was leaving he was good enough to show me some of his patients upon whom he had performed Mules' operation. They were very satisfactory.

Another point Dr. Noyes has raised is his objection to the operation on account of the reaction being so great. I think this has deterred many from doing it. I should

gather that the modern operators, the men who now do it most in our country, have got rid of most of the reaction, although possibly not quite so effectively as Dr. Buller has done, and as a rule will let the patient go out in seven or eight or nine days, instead of in three days as after common excision. The routine, I have been told, is from the very beginning to use ice for at least twenty-four and sometimes forty-eight hours almost continuously. This does not entirely prevent reaction, but it prevents bad reaction. I suppose that the whole subject is still, to a certain extent, in its infancy. I believe in a certain proportion, I do not know exactly what proportion, that the conjunctival wound gradually gets thin, and a little buttonhole forms, and that as a rule when it once begins to form it goes on enlarging, and in nearly all these cases the globe eventually comes out.

Doctor Ayres referred to a case that was performed by a colleague. The eyeball was opened and properly prepared and a glass globe inserted. In the course of a day or two considerable irritation set in, and it was necessary to remove the stitches and take out the glass ball, when pus was discovered inside the artificial globe. It happened that there was a little hole in the glass ball. It excited suppuration, and some of the pus had found its way inside.

Doctor Buller, in his reply, said : I was aware that the operation, spoken of by Dr. Reeves, of allowing the sclerotic cavity to be filled with blood instead of inserting anything artificial, had been performed and given apparently satis-factory results in some cases, but I never undertook that operation myself, believing that a collection of blood becomes really a foreign body, which is very much more liable to undergo degeneration than a smooth vitreous substance like a glass globe. I have always thought that Mules' operation is to a certain extent still on trial, and that it is worthy of a fair and impartial trial for some length of time before we think of adopting any substitute for it. This applies also to the insertion of aseptic sponge instead of the glass globe. That the glass globe does answer the purpose very satisfactorily and stays in its

place for a great many years, I have not the slightest doubt, because I have cases here in Montreal where the glass globe has been in over ten or twelve years, and everything is in a satisfactory condition. It does seem to me that by careful operating the glass globe can be introduced and maintained in place for an indefinite period in almost every instance.

ON THE HISTOLOGY OF A CASE OF SUDDEN BLINDNESS CAUSED BY AN INJURY TO THE SKULL. THE FIRST CASE OF FRESH CHOROIDAL RUPTURE HISTOLOGICALLY EXAMINED.[1]

By ADOLF ALT, M.D., ST. LOUIS, MO.

THE case which I wish shortly to report here may, perhaps, not be unique. Clinically I know it is not. Yet, if any similar case has been microscopically examined and described, I have failed to be able to find it in the literature at my disposal, nor have I in my somewhat extended researches in the field of the histo-pathology of the eye ever met with such histological changes.

The specimen came into my hands without my having seen the case previously. For it and the following clinical history I am indebted to my friend Dr. Joseph Spiegelhalter of St. Louis, Mo., who had removed the eyeball. He writes as follows :—

E. B., a lad 18 years of age, while playing with a revolver in the evening of March 23, 1897, accidentally shot himself in the head. The entrance wound of the bullet was situated in the temporal surface of the frontal bone on the left side, three-quarters of an inch above the zygomatic process and one inch behind the linea semicircularis. The wound canal passed directly forward and a little

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23

downward. In its passage the bullet had slightly injured the roof of the orbit, at least on its cerebral surface, and lacerated to some extent the base of the left anterior lobe of the brain.

I saw the lad about an hour after the accident, when I found him in the hands of two practitioners who had been examining and probing the wound canal, and had removed some brain substance mixed with several small spicules of bone. There had hardly been any hæmorrhage from the wound. The left eyelids were swollen and the eyeball protruding. The patient was in a semi-comatose condition, from which by loud calling he could be aroused sufficiently to answer some simple questions. There was only doubtful perception of light in the eye on the injured side, and touching the eyeball produced no reflex action. The pain caused by the injury seemed to be comparatively trifling.

I cleaned the wound canal thoroughly, removed what I could find of loose brain substance and bone tissue, and dressed it antiseptically.

The night following the injury the patient slept fairly well. His pulse and temperature remained normal.

The next day it was clear that the visual function of the protruding eye was absolutely destroyed. The exophthalmos increased more and more. On March 26, that is, not quite three days after the injury had occurred, the cornea, not being covered by the eyelids, showed signs of decay. I therefore proceeded to remove the eyeball, together with some adherent orbital tissue, Tenon's space having been totally obliterated.

After the removal of the eyeball I again made a thorough digital examination of the walls and roof of the orbit in order to see whether or not the bullet had per-forated the orbit. I could, however, find no opening anywhere.

I am, therefore, of opinion that the bullet had passed along the cerebral surface of the roof of the orbit, shatter-ing it to some extent, and had entered the frontal sinus near the crista. It is, no doubt, at present lodged in the sinus frontalis, and causes no apparent inconvenience.

When Dr. Spiegelhalter had reported this case to the Association of German Physicians of St. Louis, Mo., a discussion took place as to the direct cause of the sudden blindness from the brain injury, and as a consequence the specimen preserved in formol solution was given to me for microscopical examination.

I found the eyeball surrounded by a considerable amount of muscular and orbital tissue firmly matted together. Attached to it remained a piece of optic nerve almost one inch in length.

I divided the eye by an equatorial section into an anterior and a posterior half. When the sclerotic was opened a considerable amount of sanguineous fluid came from the vitreous chamber. The remaining vitreous body was adherent to the lower part of the retina. Where this attachment had taken place a fold of retinal tissue was raised to some extent into the vitreous chamber. The fold reached from the optic papilla to the very ora serrata.

When, before embedding, I removed the specimen from the formol solution to the alcohol all the tissues of the eyeball and the surrounding orbital tissue took on a more or less bright red blood colour. This, of course, showed that extensive hæmorrhage had taken place into the orbit, penetrating into all the tissues of the eyeball and into the inter-vaginal space of the optic nerve. This was microscopically visible and so extensive must the hæmorrhage have been, that it alone would have sufficed to explain both the exophthalmos and the sudden blindness, had there been no other pathological changes within the eye.

The optic nerve had evidently not been severed by the bullet, nor do I think that, from the description of Dr. Spiegelhalter, the bullet took a course in which it met with this nerve.

No ophthalmoscopic examination having been made, the clinical features, pointing in themselves to an

enormous hæmorrhage into the orbital tissue, were sufficient to explain both blindness and exophthalmos. Whether the blindness was absolute and would have been lasting, or whether the subsequent absorption of the extravasation would have led to a partial return of vision it is impossible to say.

In general, all the tissues when microscopically examined were filled with red and white blood cells.

I found the most interesting changes in the choroid and retina, and especially at the place where the raised fold of retinal tissue protruded into the vitreous chamber.

As a result of the *contre-coup* these tissues show a large number of ruptures differing as to their extent in surface as well as depth. It is particularly to these ruptures that I want to draw your attention, and more especially to the one which seems to be the type of what has clinically been termed an isolated choroidal rupture, although, as far as I know, it has never yet been examined microscopically. The other and mani- fold changes in the structure of the retina and choroid, which are remarkable since only such a short time (barely three days) had elapsed between the occurrence of the injury and the enucleation of the eyeball, I do not wish to describe here.

The simplest form of rupture of the choroid which I found produced by the injury, was a tear through the lamina vitrea and pigment epithelium. This was followed, or perhaps preceded, by a hæmorrhage which lifts up a small fold of retina. The blood is mixed with a large number of cells containing pigment and free pigment granules, evidently derived from the cells of the pigment epithelium in the neighbourhood of the rupture. The retina, excepting its bacillary layer, is comparatively unaltered.

The larger the tear, and the more the blood extra- vasated under the retina, the greater is the alteration

by the pressure in the structure of the retina, until, in some places, this can hardly be recognised as such. In spite of such considerable alterations in structure the retinal blood vessels may remain apparently unaltered, at least they are so in a number of places in this case. They are, in some of these, very hyperæmic, especially the veins, in others they are empty ; and sometimes they show signs of a beginning endovasculitis.

In some parts two or three such small ruptures of the inner surface of the choroid are situated close beside each other. Near one there seem to be evidences of a new formation of blood vessels, which grow from the choroid into the extravasated blood, by which the retina is pressed inward toward the vitreous.

In one place a rupture has taken place through the whole thickness of the choroid. The gap resulting in this manner is filled and covered over by retinal tissue. At the edge of this tear the retraction of the choroidal wound lips is plainly shown by the wavy line formed by the relaxed lamina vitrea. The pigment epithelium seems to be proliferating, and new and unpigmented cells are situated in the folds of the lamina vitrea. The retinal tissue covering the gap has lost all its characteristic features. It appears as a loose, more or less laminated connective tissue, in which are embedded a number of round cells, perhaps remnants of the retinal cells, and cells carrying pigment derived either from the choroidal cells or from those of the pigment epithelium layer.

This, I think, is the histological appearance of that condition which has clinically been termed an isolated rupture of the choroid.

Farther forward towards, and extending into, the ora serrata there is a very large gap in the whole thickness of the choroid. Here the sudden gush of blood from the torn choroidal blood vessels has torn loose a large flap of the retina and folded it backwards upon

itself. The vitreous has filled the gap in the choroid
and has assumed a markedly fibrillar structure. The
detached retina is greatly broken up in its outer layers,
although its blood vessels are still well filled with
blood, at least here and there.

All the ruptures which I have thus far mentioned
concerned chiefly and primarily the choroid, and seem
to have affected the retina secondarily only. There
are, however, also a number of places in which the
contre-coup has caused a rupture of the retina alone,
and in which the choroid has remained perfectly
intact. These ruptures, as far as I have observed
them, seem to have penetrated the whole thickness of
the retina. The woundlips of this membrane are
retracted, and the retinal elements in the neighbour-
hood of the rupture are considerably altered by de-
generative changes. The gap, resulting from the re-
traction of the woundlips, is filled with a small
amount of very loose fibrillar tissue of doubtful
origin, embedded in which is a number of cells.
Some of these are unpigmented round-cells, and
seem to be, perhaps, remnants of the retinal cells ;
others are filled with pigment granules, and are pro-
bably derived from the pigmented epithelial cells.
Whether this interposed tissue is derived from the
adjacent vitreous body, or from the retina, or from
both these sources, it is impossible to tell.

I have brought a photograph here, which is taken
from another eye, which was destroyed by a bullet
which struck the cornea obliquely. Besides other
changes not concerning us just now, the *contre-
coup* here led to a large rupture in the choroid,
causing an immense hæmorrhage. The retina in
turn was altered in a peculiar manner by this hæmor-
rhage, as, besides being detached *in toto*, its outer
layers (in some parts the bacillary layer, in others
the bacillary and outer granular layers together) were

torn loose from the remainder of this membrane. It would take too long to detail to you here the changes which have taken place in other membranes of the interesting eyeball which is the subject of report.

Since this paper was written, the last number of *v. Graefe's Archives* (xliv., 1) has reached me, containing an article by S. Ginsberg on the microscopical conditions found in an eye which had undergone an isolated choroidal rupture eleven years prior to its enucleation. This rupture, having so long been cicatrized, presents totally different features from the case of recent rupture I have just reported. Ginsberg has, however, also carefully gone over the literature of the subject, and, like myself, he could not find a single case of recent choroidal rupture which had been microscopically examined and placed on record.

With this testimony added I suppose that the case I have reported to you is really the first case of a recent choroidal rupture which has been microscopically examined.

MALIGNANT TUMOUR OF ORBIT; PARTIAL REMOVAL; RE-GROWTH; RECOVERY.[1]

By Charles Geo. Lee.

Hon. Surgeon Liverpool Eye and Ear Infirmary.

As the report of the following case raises some points of interest, both as to the pathology—or rather, perhaps, the etiology—of orbital tumours, and also the efficacy of medicinal remedies when surgical methods have proved inefficient, I trust that the few minutes during which its recital will occupy the time of the section will not be considered to have been wasted.

Mr. H., married, aged 42, by occupation a draper, first consulted me on October 23, 1895, with reference to a swelling situated at the inner angle of the right orbit, and extending down the side of the nose; in colour it was dusky red, hard and lobulated to the touch; it appeared to extend back into the orbit, from which by its intrusion it had displaced the eyeball downwards and outwards. Neither fluctuation nor any pulsation was detected, nor were there any enlarged glands present.

The patient supplied the following history; he had always had good health and never had any venereal disease; when a boy he had fallen and struck the right side of his face, occasionally he had had a discharge of pus in the mouth, but for some years there had been no trouble from this source.

Mr. H. first noticed a swelling on the side of his nose some two months before he consulted me, and for six months or more he had been under the care of a homœopathic practitioner, by whom he was told

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[1] Read at the meeting of the British Medical Association, held at Montreal, August-September, 1897.

that he was suffering from lacrymal obstruction ; at the end of this period this same gentleman said that now the case was ready for operation, and directed him to another homœopath—who, I am informed, has obtained some credit as an ophthalmic surgeon—for the purpose of having the obstruction removed.

However, at the crisis, the patient elected to place himself under my care, still being under the impression that all his trouble arose from blockage of the tear passage.

It did not require any great skill to perceive that the swelling was of a different nature than that produced by lacrymal obstruction, and I was not long in un- deceiving the patient, and in informing him that he was suffering from a tumour, probably of a cancerous nature ; it was, however, thought better to obtain a consultation with another oculist before submitting the patient to an operation. We accordingly had the benefit of Mr. Edgar Browne's opinion ; this in the main coincided with the one I had expressed, both as to the nature of the growth and the course of treat- ment, though Mr. Browne suggested that the growth might be due to the persistence of some fœtal structure ; but whatever the exact pathology might be, it was considered advisable to attempt its removal at an early date.

Accordingly, on October 28, I proceeded to expose the growth by a vertical incision extending from the upper angle of the orbit to the ala of the nose. The skin covering the tumour was exceedingly thin, and the growth itself was of a gelatmous consistence, yellowish in colour, and lobulated, being divided by fibrous strands. It was firmly adherent to the bone at the side of the nose ; on following it in an upward direc- tion it passed deeply into the orbit, and downwards it was found to extend into the antrum of the superior maxilla through an opening wide enough to admit the

little finger. A portion measuring two inches by half an inch, which comprised all that was external to the superior maxilla, and some from the orbital cavity was removed, but as we were prepared neither to excise the eyeball, nor to resect the upper jaw, we were compelled to abandon further proceedings for the present.

The patient recovered but slowly from the operation, and by January in the following year the growth had undoubtedly again increased, for it had reached the level of the orbital margin.

I now advised the patient that if another operation were undertaken, it would of necessity be of a much more extensive character, and would involve removal of the eyeball and possibly of the upper jaw. For some six or eight weeks, I saw the patient from time to time, the growth steadily increased ; after this I lost sight of him, and I confess to having entertained the worst fears as to the termination of the case, especially after having submitted microscopical sections of the growth to the Pathological Section of the Liverpool Medical Institute, and receiving the verdict of sarcoma from one gentleman, and that of carcinoma from another, each of whom is recognised as an expert in this branch of medical diagnosis.

It will be readily imagined that it was with no little satisfaction, I received a letter from Dr. Arthur Exham, of Market Drayton, under date of October 18, 1896, who wrote as follows :—

MY DEAR SIR,—Can you recollect anything of the case of a man named H —— ? His account is that he first had something wrong with his lacrymal duct, which was opened, and afterwards a tumour found in this region was removed by you on October 25 last year. Shortly after it reformed, and he saw you again and you advised another operation, which however he did not have performed. He states that it—the tumour—was pronounced by you and

others, Dr. Edgar Browne among them, to be cancer. Would you mind telling me if this is really the case? My reason for asking you is, that I saw him the other day, and there is absolutely no vestige of any tumour now, not even any thickening, nothing but a sound and healthy scar.

Will you forgive the liberty I am taking in troubling you in the matter ; but if true, the case seems curious.

Yours faithfully,

(*Signed*) ARTHUR EXHAM.

Shortly after the receipt of the above letter, the patient himself called upon me, and all that I could detect was some slight thickening at the inner angle of the orbit, corresponding to the site of the incision. He had continued to improve, and now comes the interesting fact that the patient attributes his improvement entirely to the internal use of Ceylon cinnamon, of which he had been accustomed to make a decoction by soaking 1 lb. of the cinnamon in three pints of water, slowly boiling for almost six hours, and drinking the residue, which amounts to about one pint in two days. The patient states that after taking the decoction for about three days, the pain, which had previously been excruciating, began to diminish ; and in a few days more, had entirely gone. The bulk of the tumour also shortly became less, and after taking the medicine for a few weeks the growth had entirely disappeared. The patient is still alive and well ; there is to be detected a small amount of thickening at the inner angle of the orbit, but nothing that can be called a tumour.

From this account of the case, I desire to submit two questions : (1) Was the tumour of a malignant nature ? (2) Had the exhibition of the cinnamon any part in contributing to the disappearance of the growth ?

In attempting to reply to the first query, we have

the clinical appearances which were decidedly sug-
gestive of malignancy, strengthened by the microsco-
pical sections pointing in the same direction. Mr.
Snell, of Sheffield, was kind enough to draw my atten-
tion to a paper by M. Panas, published in the *British
Medical Journal* for October 19, 1895, in which that
talented and acute observer describes a certain class of
cases which he terms pseudo-malignant tumours of
the orbit, and notices that these tumours, which by the
way, are invariably symmetrical, and in this respect
differ from my case, frequently disappear with the aid
of alterative medicines, chief among which he men-
tions arsenic, or by the formation of accidental auto-
toxines, but without mercury. It may be that my case
belongs to this class.

As to the efficacy of cinnamon in cancer, I can only
say that the present is the only case that I have person-
ally observed. The adoption of this remedy is, I
believe, due to the initiation of Dr. J. Carn Ross,
physician to the Ancoats Infirmary, and his reasons
for selection of this particular aromatic are interest-
ingly and quaintly put, in a pamphlet published by the
Leigh Brown Trust, of London, in 1895. Dr. Ross
had previously in the *Lancet* of July 21 and October
20, 1894, published some cases in which he had used
the remedy.

I learn from the current medical journals that
cinnamon is at the present time undergoing its trial
as an antidote to scarlatina.

CONTRIBUTION TO THE TREATMENT OF SYPHILITIC AILMENTS OF THE EYE BALL.[1]

By Dr. Jehin-Prume, Montreal.

THE treatment of syphilitic ailments has long been the object of constant research and endless discussion.

The remedy which we use against it is mercury, and there is no serious suggestion of giving up this treatment. Of late years, however, serum injections appear to have caused a revolution in the practice of therapeutics.

We read in the *Medical Annual* (New York, 1897 p. 554), (Norman W. Walker, M.D., Edinburgh) :—

"There are several papers dealing with the serum treatment of this disease, from the perusal of which it is evident that the method is one of some value.

"Pellizzari (*La Clinica Moderna*, February 15, 1896) reports a case where treatment was begun on July 5, and by October 10, 1892, all symptoms had disappeared, and the patient remains up to the present time perfectly well.

"Pellizzari is satisfied that in every case the manifestations are rendered milder. The best results were obtained when the treatment was begun early. He therefore believes that it confers a sort of immunity on the tissues.

"Gilbert and Fournier used the serum for a patient in the late stage, and found the results quite satisfactory. They have also tried to get a protective serum from animals inoculated with the disease, and some patients were treated with this serum. The results were not so satisfactory."

Undoubtedly the serum treatment is called upon to

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[1] Read at the meeting of the British Medical Association, held at Montreal, August-September, 1897.

play a great part in the future. However, it is impossible for us to consider it seriously as yet. The observations obtained up to this day, although very promising, are not conclusive enough to point to positive and absolute rules.

Mercury being then the only positive treatment now known, we have, so far as results are concerned, only to study which mode of administration will give us the quickest and best.

Mercury has been administered in many different forms :—by the mouth, by subcutaneous injections, frictions, sub-conjunctival injections, &c., &c. But there are cases where the digestive organs seem to tire, where the patients refuse to submit to subcutaneous injections, and where sub-conjunctival injections, although as well made as possible, are so painful that they cannot be borne. Frictions, even when regularly administered, give but very uncertain results in many cases.

All the different modes of administering mercury have undergone a certain revolution ; thus it is that we have passed from absorption by the digestive canal to frictions and fumigations, then to subcutaneous and sub-conjunctival injections, and lastly to intra-venous injections.

We were present at the first intra-venous injections practised in Paris, we have used the method over two thousand times, and are in a position, therefore, to discuss these therapeutical proceedings with all the advantages or disadvantages they may possess, and give the operative technique down to the minutest details.

What are the real advantages of intra-venous injections over the other methods of administering mercury ?

It is only by analysing the disadvantages which

the other methods may offer that we can answer this question.

If mercury is administered by the digestive tract it sometimes happens that, after a certain time, the treatment must be discontinued on account of the resulting bad condition of the digestive organs, dyspepsia, diarrhœa, gastralgia. Fournier says we even meet with patients whose stomach and intestines show themselves absolutely refractory to mercury, and which, literally, will not tolerate it.

Frictions do not have this disadvantage, they act quickly and surely, but, on the other hand, every practitioner knows how hard it is, in private practice, to carry out this treatment efficiently, many persons refusing to apply a repulsive and apparently unclean pomatum to their skin. Moreover, frictions are liable to cause mercurial affections of the skin, and not unfrequently stomatitis.

It is a curious fact that with intra-venous injections, stomatitis hardly ever exists. In two thousand intravenous injections we have had but two cases of stomatitis, and these very slight ones.

Intra-venous injections act very rapidly, and if the doses are properly regulated they produce none, or hardly any, of the general symptoms which are apt to be induced by the other methods of administering mercury. They produce no local phenomena unless the injections are accidentally made in the peri-vascular tissue, which sometimes happens when the patient's venous system is badly developed. It is therefore preferable to abstain from these injections when treating a person whose superficial veins are not quite visible ; for in such a case the same inconveniences will present themselves as in subcutaneous injections.

The salt which we employ for the intra-venous injections is the cyanide of mercury. It is soluble in water, ether or alcohol, and is very poisonous. This

25

salt of mercury was first used for injections in 1874 by Cullingworth ; since then a large number of physicians have used it, amongst others Abadie, Boer, de Wecker, Darier, Panas, &c.

The preparation of cyanide of mercury for injections requires special care. Its preparation for intra-venous injections requires especial care, and is best carried out as follows :—

Take 1 gram of the salt and dissolve it in 100 grams of distilled and filtered water. Place the whole in a very clean bottle which has been carefully sterilised, and cork it with a ground glass stopper.

Operators must be very particular as to the clearness of the solution prepared.

For instruments we need a syringe, a platinum needle, an alcohol lamp, a flannel bandage, absorbent cotton-wool, a solution of alcohol (one-third), or a little ether, and collodion.

The syringe we usually use for subcutaneous injections has a glass cylinder provided with a nickel steel mounting, and a steel piston furnished with washers of different materials, such as amianthus, rubber or cork. These syringes, which are excellent for subcutaneous injections, become very dangerous in intra-venous treatment. They have the disadvantages of being difficult to sterilise, their different parts being somewhat difficult to take apart. Further—a point which is to be specially avoided in intra-venous injections—foreign bodies liable to cause embolism are often due to the washers fraying, and scraps of amianthus being swept into the circulating current ; cork washers break in small particles, and for this reason present the same danger. As to rubber washers, they have a double disadvantage ; first, the drying of the rubber often renders the syringe useless for several hours ; and secondly, if we wish to prevent

this inconvenience the piston must be lubricated with some kind of oil.

It is, then, important to have an instrument all the parts of which are removable, and can therefore be sterilised, and one which possesses neither amianthus, cork or rubber parts.

Mr. Wulfing-Lüer, of Paris, has put on the market a syringe wholly constructed of glass. This syringe was presented to the Société de Biologie de Paris by Dr. Malassez of the Academy of Medicine, and to the Société d'Ophtalmologie and the Société de Syphiligraphie by Dr. Charles Abadie.

It is, as we have already stated, made entirely of glass, and is composed of two pieces only, the body of the pump and the piston, which can be separated from each other at will. The piston is so constructed that it slides easily and softly, without causing any loss of the contents, and without allowing air to penetrate within the syringe. Thorough sterilisation of the instrument can easily be effected.

There is also the question of needles to study. They are generally made of tempered steel or iridised platinum ; we particularly recommend these latter ; although more expensive, platinum needles are far more advantageous. Before making any injection whatever it is important to have the needle well sterilised. This is obtained by passing the needle through the flame of an alcohol lamp. Now heat softens steel needles, which then break easily (another danger), but this, of course, does not happen with platinum ones. At Dr. Abadie's we made an average of 80 or 100 injections per day, and used but one needle per week.

Nothing is more simple than the manner of proceeding with the operation.

You take a band of flannel (1 metre in length by 4 fingers in width), which is bound tightly round the

patient's arm ; and then make him keep his arm in a hanging position, moving the fingers the while so that the veins may get well filled with blood.

The question of the venous system is a most important one in this treatment. The patient must have conspicuous, not filiform veins ; otherwise it might be unwise to proceed with the injection. The reason of this is the danger there would be of injecting the liquid in the peri-vascular tissues and producing nodes or very painful abscesses. It is preferable in such cases to resort to frictions or subcutaneous injections.

As to the choice of the vein, the most salient or most superficial one is chosen. If the vessel is mobile, it can be steadied with the thumb and index of the left hand while injecting with the right one.

Having applied the bandage and chosen the vessel in which you desire to inject, you wash the part carefully with sublimate solution (bichloride of mercury 1 to 2000), and then pass over it a pledget dipped in alcohol or ether.

Then take the syringe and pass the needle through the flame of an alcohol lamp, draw into the syringe some of the solution to be injected, and again pass the needle through the flame and squirt out a few drops of the solution in order to expel the air which may be within the syringe or needle. This done, you ascertain by looking through the transparent syringe whether it contains dust or air.

The patient is told to keep his arm in a horizontal position, and the vein is pierced lengthwise (so as to avoid piercing it through and through). When the needle comes within the vein a sensation of non-resistance is felt, caused by the needle entering the hollow of the vessel after having passed through the different tissues. Before injecting the bandage must be removed, then push the piston home, remove your

needle and stop up the little wound with absorbent cotton wool dipped in collodion. The operation, if indeed it is worthy of being called an operation, taking hardly two or three minutes in all, is now completed.

The patient feels no pain whatever, the only discomfort is when the bandage is applied, the compression bringing on a rather disagreeable numbness of the arm and hand.

Dose.—The injection is made with a syringe of one cubic centimeter capacity. Each cubic centimeter of the solution (one to the hundred) contains one centigramme of the mercurial salt. The dose for an adult is, at the maximum, one centigramme.

We have treated a lady who, a few hours after a subcutaneous injection, felt such gastro-intestinal pains, vertigo and vomiting, that she believed herself poisoned. To this person, who is now quite well, we have never been able to administer more than half a centigramme, that is, half the maximum dose.

It would, then, be prudent to begin by injecting a fourth of the syringe capacity at first, augmenting the dose progressively as the patient finds he can bear it. For children begin by injecting an eighth part of the syringe capacity and increase gradually to half a centimetre of the solution, that is, half of the syringe capacity. We have treated a young patient, 14 years old, who had parenchymatous keratitis ; we brought the dose to one centigramme in this case, but this is very unusual, and extreme care was necessary.

Mercurial treatment, like any other treatment, must be continued a certain time to obtain results.

We usually proceed as follows :—

First Series.—Twenty injections, one every other day. An interval of twenty days.

Second Series.—Twenty injections, one every third day. An interval of twenty days.

Third Series.—Twenty injections, one every fourth day. An interval of twenty days.

Last Series.—One injection per week as long as the doctor deems it advisable.

We have had patients who, after having followed the above treatment, would come back at more or less distant periods for a series of from four to six injections.

What are the objections made against the intra-venous method ?

The dangers which may supervene sooner or later : from " foreign matters " and " air bubbles."

These two objections can no longer be urged when a suitable syringe and a well prepared liquid are used.

From " embolism " and " thrombosis."

My answer is that observation of a very large number of cases teaches us that these dangers do not exist if the operation is carried out with due antiseptic precautions.

Dr. Garl (Munich) who daily practises intra-venous injections of mercurial salts, writes in the *Münchener Medecin Wochenschrift* (1895, No. 20, page 465)—

(1) Intra-venous injections are painless.

(2) The quantity of mercury injected is minimum, and may be accurately regulated.

(3) The cure of syphilitic manifestations is obtained very rapidly.

(4) The injections are absolutely inoffensive (judging at least by known facts up to the present day).

(5) The treatment is not conspicuous, and does not prevent the patients from pursuing their daily occupations.

Abadie, Darier, and several others, have pursued this method to a large extent, and all alike bear witness to its safety and efficiency.

Finally, I myself have personally performed over 2,000 intra-venous injections without accident, the

result being definite improvement in at least 90 per cent.

The following are a few significant cases :—

B. H., 33 years old. Syphilis in 1882 ; facial para- lysis in 1884 ; strabismus and ptosis in 1894. After 12 intra-venous injections ptosis disappeared ; after 18 no strabismus. Other mercurial treatment had failed with this patient. Health perfect.

E. V., 40 years old. Syphilitic irido - choroiditis. Vision $= \frac{1}{40}$. After 14 injections, vision $= \frac{1}{6}$.

James T., 30 years old. Vision $= \frac{1}{20}$. Syphilitic chorio-retinitis. After 26 injections, vision $= \frac{1}{10}$.

M. G. Chorio-retinitis. Vision $= \frac{1}{16}$. Friction and pills gave no results ; 75 sub-conjunctival injections, nothing; 130 sub-cutaneous injections, nothing. After 24 intra-venous injections, vision $= \frac{2}{3}$. General health perfect.

Mrs. E. G. Double optic neuritis of two years' duration. Vision $= \frac{1}{5}$. Found it possible to admin- ister other mercurial treatment to this patient owing to gastro-intestinal troubles. After 60 intra-venous injections, vision $= \frac{2}{3}$. General health perfect.

Miss M. P. Hereditary syphilitic chorio-retinitis. Cannot read. After 16 injections is able to take a position as book-keeper in a store.

Miss E. G., 24 years old. Chorio-retinitis of four years' duration, roseola, mucous patches of the mouth. After 12 injections, no roseola and mucous blotches. Vision before injections $= \frac{1}{2}$. Vision after injections $= \frac{2}{3}$.

E. B., 16 years old. Paralysis of the third nerve, hereditary syphilis. Other treatment gave no results. After 33 injections no ptosis or strabismus ; progressing favourably for two years.

From personal observations we are of opinion that intra-venous injections should be practised only in

serious syphilitic cases, where immediate results are required ; when other mercurial treatment has given no results, or very slight ones ; when the other methods of administering mercury are not acceptable to the patients.

CAMPOS (Paris). Experimental and Clinical Re-
searches regarding the Secretory Nerves for
Tears. *Archives d'Ophtalmologie, September,* 1897.

The work and enquiries, the results of which are em-
bodied in this paper, were carried out in the Physiological Laboratory of the Faculty of Medicine and the Laboratory of Clinical Ophthalmology attached to the Hôtel Dieu, Paris. It is not necessary to enter upon anatomical descriptions of parts, but at the outset it is useful to make two remarks upon the anastomoses in which the lacrymal nerve participates. In the first place, then, as regards the junction with the fourth nerve, authors are agreed that the fibres which course along with this last are only borrowed from the ophthalmic division of the fifth ; and further, there is an anastomosis with the orbital branch of the superior maxillary nerve. Junction may be effected also with the frontal or the nasal, but these are not con-
stant ; one or two instances have even been noted in which the lacrymal nerve was entirely absent. Béraud has demonstrated a fibre running from the ophthalmic ganglion. The connections between the sympathetic and the fifth nerve are many ; and lastly, there is great division of opinion as to whether the secretory nerve is the fifth or the sympathetic.

Such was the state of opinion when in 1893 Goldzieher announced his opinion that the ideas previously entertained were incorrect, and that the lacrymal secretion was under the command of the facial nerve. He based his assertion

upon the clinical fact that in certain cases of facial paralysis lacrymation was suppressed. Jendrassik has demonstrated a possible course for the fibres from the facial nerve to the gland ; these fibres may leave the facial nerve at the geniculate ganglion, pass by the great superficial petrosal and the vidian through the spheno-palatine ganglion, and reach the lacrymal nerve by way of the orbital branch of the superior maxillary which emerges from the nerve trunk at the level of the spheno-palatine ganglion.

Certain anatomical observations seem requisite for the elucidation of this matter, but can we rely upon experi-ments on animals for this purpose ? The fact that in the domestic animals the orbital branch, on which the whole of Goldzieher's theory depends, forms no connection with the lacrymal gland, seems to destroy entirely the value of Herzenstein's and of Wolferz's experiments. Czermak's experiment also proves nothing, as is shown by Reich, since the stimulation of the trunk of the fifth nerve which he employed may well have produced lacrymation simply as a reflex. The same fact renders inadmissible the asser-tion of Tribondeau, founded upon experiment on the dog, that the facial is the sole route by which nervous influence reaches the cells of the gland; and also that of Laffay, who, after dividing the facial nerve on one side failed to obtain lacrymal secretion on that side, although the same stimulation of cornea or conjunctiva on the healthy side produced an abundant lacrymation.

In regard to the experiments upon the sympathetic, authors are not quite in agreement. Herzenstein has obtained no result at all on section of the sympathetic trunk below the superior cervical ganglion, nor even by stimulation of the superior portion ; arguing from ana-logy with the salivary secretion, however, he considers it possible that the sympathetic may produce a secretion of tears differing from that produced by the fifth nerve. Wolferz and Demtschenko have observed secretion on excitation of the sympathetic. Reich, on the contrary, has only obtained tears in a small number of cases on

stimulation of the superior end of the cervical sympathetic. Arloing, employing the goat and the ox, has obtained no result from excitation of the upper portion of the vago-sympathetic cord, although section of it immediately produced hyper-secretion. Tépliachine, however, obtained results precisely the contrary of these. Reich has in vain stimulated the peripheral end of the fifth nerve. Herzenstein and others assert that they obtained increased secretion by excitation of the peripheral end of the lacrymal nerve; their methods, however, of establishing the existence of an increased flow is not above suspicion.

One must not forget that there exists in the domestic animals a special organ, named Harder's gland, which in the dog may attain dimensions equal to those of the lacrymal gland; its secretion is viscid and whitish. Its presence is noted by most of the experimenters quoted, but perhaps they would have done wisely to remove it altogether as a possible source of error. Perhaps the whitish fluid obtained by Demtschenko on stimulation of the sympathetic came from it; Vulpian and Journiac have attributed to it in part the secretion obtained by faradisation of the tympanic membrane in the rabbit.

But if, as we have seen, the seventh nerve seems in animals to have no part to play as regards lacrymal secretion, is it so also in man? Tépliachine asserts that it has, basing his statement upon a diagram by Sappey, which indicates the orbital branch of the superior maxillary nerve arising above or posterior to the spheno-palatine ganglion. Unfortunately for his argument Sappey's diagram is in this matter precisely contradictory of his own letterpress, and of the statements of other anatomists. Another possible route is by the anastomosis of the lacrymal twig coming from the orbital branch of the superior maxillary with the lacrymal nerve. Testut states that this is uncertain, but all other anatomists appear to consider it a constant relation.

These considerations, the absence of communication between the orbital branch of the superior maxillary and the lacrymal nerve in the domestic animals, and the

presence of a Harder's gland in them, have induced
Campos to endeavour to clear up the subject by experi-
menting upon monkeys, since their anatomical relations
so exactly resemble our own. Into the details of these
operations it is not necessary to enter here, but the results
may be briefly stated.

(*a*) On stimulation of the lacrymal nerve, even with a
somewhat powerful current, all that could be affirmed was
that the eye operated upon seemed to be slightly more
moist than the other ; no definite conclusion could be
drawn.

(*b*) Stimulation of the lacrymal twig of the orbital
branch of the superior maxillary nerve produced an
abundant flow of tears coursing over the cheek ; on stop-
ping the electric current and mopping up the fluid the
eye remained dry ; when the stimulus was again applied
tears once more flowed abundantly.

(*c*) On stimulation of the upper extremity of the sym-
pathetic trunk on the right side below the superior
ganglion, there was no result.

(*d*) Similar experiment on the left side, no result.

(*e*) On division of the great superficial petrosal nerve
at the level of the geniculate ganglion, the eye of that side
became slightly moist, but this only lasted for a very brief
period. Subsequently ample proof was given that division
of this nerve did not prevent the secretion of tears in
abundance. The conclusion derivable from this is that
the lacrymal nerve contains secretory fibres absolutely
independent of the facial, and many in number. The
operation devised by Campos in order to reach this region,
so difficult of access, is very ingenious, and it will repay
the trouble to read his description of the procedure.

Next follow certain clinical observations :—

(1) As regards the fifth nerve. In a recent work Gérard-
Marchant and Herbet collected the records of all the
published cases of resection of the Gasserian ganglion, of
which there are ninety-four. Amid this large number
only two authors, v. Hippel and Krause, have observed
any diminution of the lacrymal secretion upon the side

operated upon. Nevertheless Krause adheres to Gold-
zieher's theory. He admits, with Francke, that in order
to obtain access to the ganglion one is obliged to detach
the dura from the base of the skull, and the great super-
ficial petrosal which lies close by may thus be wounded.
To confirm this Krause mentions a case in which intra-
cranial section of the third branch of the fifth nerve was not
followed by any alteration in the amount of the secretion
for some time, but later it decidedly diminished. His
view is that the great superficial petrosal nerve had
become implicated in the cicatrix. In two cases, how-
ever, under Gérard-Marchant's own care, removal of the
ganglion was followed by modification in regard to the
secretion. Though this observer is quite sure that the
eye after operation remained as moist as before, and as
that of the other side, he has omitted to note whether on
emotional disturbance, or in very bright light, lacryma-
tion is as free. In a case under the care of M. Panas, of
paralysis of the fifth nerve, under ordinary conditions the
eye was moist; the patient could give no information as
to difference on weeping. Obviously it is useless to en-
deavour to excite a flow by stimulation of the nasal
mucous membrane in such cases. It ought to be added
that according to Fuchs the eye remains dry when the
patient weeps in those cases of neuro-paralytic keratitis
dependent upon paralysis of the fifth nerve.

(2) As regards the cervical sympathetic. In a woman
suffering from exophthalmic goitre Gérard-Marchant and
Abadie removed from both cervical sympathetic trunks
the upper ganglion, and some part of the descending
portion. The eyes remained moist, there was no dryness
of the nasal membrane, and acetic acid applied to the
nose produced abundant lacrymation. A similar state
of affairs was present in another patient who had under-
gone the same operation, also on account of exophthalmic
goitre.

(3) As regards complete paralysis of the facial nerve.
Somewhat numerous cases have now been published of
paralysis of the facial, in which there was complete

suppression of lacrymation. In testing such cases observers should be very careful to be sure there is not also present paralysis of the fifth, as Tépliachine has found it necessary to point out. Campos relates a case at length in which there was right-sided facial paralysis, the seat of lesion being above the origin of the great superficial petrosal. There was marked dryness of the eye and nasal mucous membrane upon the right side. When the patient wept the right eye still remained quite dry, and even when acetic acid vapour was inspired.

Campos therefore comes to the following four conclusions :—

(1) The lacrymal nerve contains very numerous secretory fibres independent of the facial nerve.

(2) Experiment shows that the orbital branch of the superior maxillary nerve contains also secretory fibres. Clinical evidence goes to show that these really belong to the facial.

(3) No secretion results from experimental stimulation of the sympathetic, and, clinically, removal of that portion is not attended by any alteration in the quantity of tears.

(4) In cases of complete paralysis of the facial, in which the great superficial petrosal is implicated, one cannot obtain secretion of tears by reflex stimulation, nor does increased flow take place under the influence of emotion.

W. G. Sym.

Prof. MULDER (Groningen). Concerning the Compensatory Rotation of the Eye on Inclination of the Head to Right or to Left. *Archives d'Ophtalmologie*, *August*, 1897.

A paper on this subject was published in the *Archives de Physiologie*, 1894, written by Contejean and Delmas, in which these authors gave out that they had come to the conclusion that no such movement took place. In their

investigation they utilised the blind spot and its relation to the fixation point, a method already employed by Fick. They regarded the opinions formerly entertained as erroneous, and considered that the error arose from alteration in the position of the head having been allowed to produce a change in the relation of the visual line to the head ; thus a movement of rotation had been simulated.

It is a well-known circumstance that a marked apparent rotation of the eye round its visual axis occurs, if while one watches one's own eye in a mirror one inclines the head to right or to left : this is because the visual axis is altered with reference to the head. Donders recognised long ago where lay the cause of error, and showed that if one varies the experiment by affixing an upright mirror to a handle or bar held between the teeth. the apparent rotation completely—or almost completely — disappears, since the mirror then 'follows the movements of the head. One result of this experiment of Donders was that for some time the existence of any rotatory movement of the eye was doubted, but the same author subsequently, by means of experiments more exactly conducted, in which he made use of certain secondary or after-images, proved the existence of some rotation of the eye. Evidently Contejean and Delmas have not been aware of this second series of experiments by Donders, for they have represented his former views as though they were his final opinions.

The better to explain matters Mulder gives a brief historical sketch of the subject. Donders, and those who worked under his directions. have studied the subject largely by means of the after - images. The method adopted was somewhat as follows :—Above a card. maintained in a vertical position and attached to a handle held between the teeth, was suspended a brightly coloured ribbon. upon which the experimenter fixed his gaze for some time. When the ribbon was removed an after-image was produced. parallel to a line previously traced upon the card: but when the observer inclined his head the two lines formed an angle, which angle increased with

greater rotation movement of the head. According to Donders this compensatory inclination was about equal to one-eighth of the angle through which the head was moved. Skrebitsky, working in Donders' laboratory, made it out to be about one-tenth. Albert Nagel profited by his own astigmatism to test the rotation movement by affixing to the handle held between the teeth the well-known Rising Sun test. On rotation of the head the most sharply visible line altered also; by this means he made out the eye movement to be one-sixth of that of the head. It is evident that in these three experiments the direction of the visual line underwent no change in its relation to the head.

The existence of a wheel movement, then, appears beyond question, but many points in regard to it, besides the mere degree of rotation, are left unsolved by the experiments of Donders, Skrebitsky, Nagel and Woinow. And besides, their methods of investigation were not irreproachable, for there is no means of indicating exactly the degree of rotation of the head or the precise position of the secondary image. Mulder accordingly set to work under the advice of Donders, in 1874, to repeat these experiments by a method which he devised with the view of eliminating these causes of errror, and soon discovered that the degree of rotation of the eye did not in all positions bear the same relation to the rotation of the head. Thus in his own person, when the head was horizontal the rotation of the eye was equal to $6°$, while for the inclination between $60°$ and $90°$ it only increased by about $\frac{1}{2}°$. He also was able to show that the degree varied in different individuals. sometimes rising to double the amount which he himself exhibited. This fact will help to explain the contradictory results arrived at by previous observers. But further, he was forced to the conclusion that the movement was not so simple as had at first been supposed, but that it was possible to distinguish a permanent rotation, such as had been previously recognised. and which remained when one kept the head tilted. and a transitory element besides.

Careful investigation showed that when the head under-
went a somewhat rapid movement of inclination the
secondary image suffered at first a retardation, even to
the extent of 20° or more, which pointed to an equal
compensatory rotation ; but when the head remained
stationary the image followed to the degree which repre-
sents the permanent rotation. The same phenomena
showed themselves when the head returned again to the
vertical position. These facts must be interpreted as
meaning that the eye, whenever rotation of the head
takes place, endeavours to retain its former position by
a rotation in the contrary sense, probably for the pur-
pose of preventing a too rapid dislocation of retinal
images and a consequent apparent displacement of objects.

A short time previously Breuer, experimenting also by
means of secondary images, showed that a marked com-
pensatory rotation was also manifested if one turned
rapidly round his vertical axis, the face being all the while
directed downwards. He believes that there exists a
connection (*rapport*) between this compensatory rotation
and the semicircular canals of the labyrinth. A similar
phenomenon is manifested when one turns the head rapidly
to right and left, as in the gesture of negation, or throws it
forwards or backwards round a horizontal axis. In all
these cases the eyes, while not actually fixing any object,
are yet, generally speaking, maintained looking towards
one point in space. It is easy to establish this fact
when one has before the eyes the strong secondary image
of a flame, for it, when the head is thus moved, still main-
tains one position in space. This circumstance, which
Mulder has verified for himself, is produced by the inter-
vention of the semicircular canals which represent the
organs of equilibrium of the head, and indirectly those of the
whole body. It has been demonstrated in animals that if
the labyrinth be destroyed equilibrium is upset, and the
compensatory movements of the eye abolished.

Though Mulder experienced no difficulty in becoming
conscious himself of the transitory rotation by means of
the secondary image when the head was turned to right or

to left, it cost him much trouble to convince others. This difficulty arose chiefly because in most persons the transitory rotation, and its consequently developed secondary image, have so very brief an existence; they are gone almost before the head has actually reached its new position, and there then remains nothing but the permanent element. Donders, who himself repeated the majority of Mulder's experiments, was only half convinced; but the author believes he is now able to show very easily, by means of the enlarged image seen in a concave mirror fixed to a support held between the teeth, the movement of one's own eye : in default of a concave mirror one may employ a plane mirror and a convex lens.

Contejean and Delmas conducted their method of observation pretty much as follows :—Upon a screen, at 47 centimetres distance from a fixation point, was placed a small black ellipse 20 centimetres in height and 15 centimetres in width, which at a distance of 1·50 metres corresponds exactly to the blind spot, and consequently is invisible to an eye suitably placed. To ensure that even on movement of the head the visual line should remain constant, there were fitted up two pieces of fine network, one at a distance of 1 metre from the screen, the other nearer to the eye ; so long, then, as the strands of the two networks and the fixation point are kept in line, the visual line cannot have altered with reference to the head. This method is regarded by Mulder as at once primitive and complicated, but by this means the two above-named observers established that the least movement of the head to right or to left caused the upper or lower part of the black spot to appear in the form of a crescent, proving that, at all events partially, the eye followed the movements of the head. They observed further that when the black spot on the screen was displaced round the point of fixation by a number of degrees equal to the inclination of the head, the spot again vanished.

Mulder's own method is as follows :—To the distal end of a horizontal bar projecting from between the teeth, about 25 centimetres long—the mouth-piece, lacquered to give the

26

teeth a better grip—is fixed a piece of white cardboard.
Upon this is marked the fixation point in order that in all
positions of the head the eyes may keep one direction. It
is then comparatively easy, keeping one eye closed, to
trace upon the card as a black mark the blind spot. If
now one inclines the head laterally, the upper or the
lower portion of the blackened area begins to appear
according as the head is moved to one side or to the
other, showing that the eye has undergone a rotation about
its own visual axis, since the chart and the eye have been
moved through equal angles. To determine the degree of
rotation which takes place with each inclination of the
head, he proceeded upon the following lines :—At the
extremity of the bar there is a graduated disc, in front of
which hangs from the centre a weighted thread ; this of
course indicates readily the angle through which rotation
has occurred. Behind this disc stands a second, which is
movable round an axis coinciding with the centre of the
first. Upon this second disc is marked a small dark spot
at a distance from the central point (which is at the same
time the fixation object), such that when the disc turns
this spot may pass into the blind area to disappear and to
reappear when pushed further. It is well, seeing that the
distance of the blind spot from the fixation point varies
somewhat in different individuals, to have the rod or bar so
made that its length can be altered. To use the apparatus
we proceed thus :—The mouth-piece is firmly grasped
between the teeth, and we make sure that the head is being
held vertically; the weight points to o° on the scale. We
then turn the second disc—keeping the gaze rigidly fixed
upon the central fixation point—until the dark dot just
disappears at the superior limit of the blind spot. The
upper portion of the distal disc is finely graduated, and a
needle fixed to the first disc as a pointer indicates the exact
position on this scale when the dark dot becomes invisible.
The head is now inclined laterally, and the distal disc
turned so that the dark spot reappears at the upper edge
of the blind area. One can then read off in degrees the
exact amount of rotation of the eye for a definite amount

of rotation of the head. He has found in his own person that the eye rotates through 6° when the head is placed horizontally, which corresponds pretty exactly with the results obtained by means of after-images; in other persons he has found a rotation of 10° to 12°. Mulder considers that the method might prove useful as a test and measure of defect in cases of paralysis of an oblique muscle. Another fact that can easily be established is whether the same degree of eye-rotation is maintained on prolonged maintenance of the horizontal attitude of the head—for example, when lying in bed. Mulder had failed to settle this by means of the after-image method as the images are so very transitory. Nagel attempted the same, making use of his own astigmatism, but his results were not very reliable. Mulder, employing his new apparatus, finds that the amount hardly varies at all.

W. G. Sym.

ÉMILE BERGER. Remarks concerning certain Ocular Troubles dependent upon the General Condition. *Archives d'Ophtalmologie, August*, 1897.

Of late years the relation which maladies of the eye bear to other diseases of the body generally has been the subject of numerous publications, and there has been described as occurring during the course of, or subsequent to various pathological processes, the development of ocular troubles which had escaped the attention of previous writers. These manifestations in the eye have been particularly frequently described of late years in relation to diseases of the nervous system and to microbic diseases. Nor is it difficult to understand that this should be so, when one remembers first that the eye really is but a part of the central nervous system, and has with it the closest possible relations, and secondly that toxines are believed to have a special affinity for nerve tissue, and more parti-

cularly for the nerves of the globe and adnexa. It appears
to Berger, however, that in certain recorded cases the
inquiry into the general condition of the patient has not
been sufficiently strict. Other authors as well have
directed attention to the fact that in certain cases, a
distinct relation of cause and effect between general
maladies and ocular troubles has been assumed, where in
reality there was nothing more than a coincidence.
Coppez denies that the different eye troubles which are
observed after influenza are all set up by that malady.
Nuel is doubtful whether certain of the ocular symptoms
put down to toxic conditions and to affections of the
nervous system, are not in reality of hysterical origin. As
a matter of fact, we know that hysteria is apt to compli-
cate many other affections ; the retraction of the field of
vision which is so often (?) noticed in Graves' disease
may be as much due to hysteria as to exophthalmic goitre ;
certain eye troubles manifested by persons suffering from
intestinal worms are hysterical in their nature, and much
of our teaching in regard to the relation of eye disease
to general illness requires revision. This revision is seen
to be the more requisite when we recollect the difference
in the explanation of the occurrence of these symptoms
now from what was formerly in vogue. All those ocular
troubles taking their origin in affections of the nasal fossæ
and neighbouring parts, or in the female genital organs,
were formerly described as reflex ; now all or nearly all
are regarded by authors as due to the action of toxines.
It is not correct to speak of cases of keratitis and con-
junctivitis as " reflex symptoms " produced by nasal
affections, for an inflammation can scarcely be reflex.
And we must also set our faces against the idea that such
reflex ocular troubles are toxic in origin ; they disappear
when anæsthesia of the mucous membrane is brought
about by cocaine. This fact Berger regards as in favour
of his theory, inasmuch as it shows to be due to a state of
irritation of the terminal filaments of the fifth nerve, those
ocular troubles called reflex in presence of affections of
the nose and sinus. Certain diseases of the eye which are

secondary to maladies of the nose are incontestably due, however, to microbic origin, *e.g.*, iritis.

The reflex affections of the eye (amblyopia, troubles of accommodation, &c.), due to the state of irritation of the fifth nerve, moreover, present clinical symptoms differing from those of toxic origin. Those authors who ascribe the amblyopia observed in the course of affections of the nasal fossæ to toxines, find themselves confronted by the fact that the clinical symptoms of that amblyopia are essentially different from those of toxic amblyopia produced by alcohol, tobacco, diabetes, influenza, &c. Amblyopia due to irritation of the fifth nerve presents a peripheral retraction of the field of vision ; the symptoms disappear rather rapidly after removal of the cause (*e.g.*, by extraction of a carious tooth), without leaving any ill effects behind. Toxic amblyopia, on the other hand, presents, in its typical form, a central scotoma, it passes off but slowly after removal of the cause, and it is apt to leave in its train pathological changes of a more or less permanent character.

Berger next relates, at some length, his observations on four cases, which in his opinion tend strongly to show that the ophthalmic surgeon ought not to be content with coming to the conclusion that a disease is present in his patient as a sequel to which the eye symptoms have appeared, but should carefully enquire into the general condition in order to make sure whether these symptoms are not due to a hysterical or neurasthenic state, which has been engrafted on the original illness. The four cases referred to are, respectively, examples of amblyopia more or less distinctly of the hysterical type, (1) in a man with yellow fever; (2) in a man with "*maladie des caissons*" ; (3) in a man with Addison's disease ; (4) in a woman on whom hysterectomy had been performed. It is not necessary for us to go into details of the case here; for these the original paper ought to be consulted. In each of them an amblyopia which, at first examination, and sometimes by several observers, was believed to be due to poison of the original disease (in the last case the whole of the original

symptoms " necessitating " hysterectomy may have been hysterical), turned out to be hysterical or neurasthenic in reality.

W. G. SYM.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Mr. H. R. SWANZY, President, in the chair.
THURSDAY, OCTOBER 21, 1897.

After thanking the society for the honour conferred upon him by his election to the Presidency, Mr. Swanzy proceeded to consider some Congenital Cases of Disturbed Association of Muscular Action, Coloboma, and Microcephalus with Proptosis, the last being illustrated by lantern slides.[1]

Some Experiments on the Union of Corneal Wounds.—Mr. Ernest Clarke related the results of some experiments on this subject, consisting of various operations on the corneæ of rabbits whereby the anterior chamber was completely emptied of aqueous with the view of ascertaining the time taken by these wounds in uniting sufficiently to allow the anterior chamber to be re-formed. Descriptions of the methods adopted in operating and preserving the specimens were given. Two classes of experiments were performed. In the first class the animal was kept under an anæsthetic and killed. The anterior chamber was found to be present in two minutes, and fully re-formed in twenty-five minutes. In the second class the animal was allowed to recover, and, after varying intervals, ranging from half-an-hour to two and a half hours, again placed under an anæsthetic and killed. The movements of the animal caused delay in the

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[1] A more detailed notice of the President's introductory address will be inserted in the ensuing number.

re-formation of the anterior chamber. The average time was one and a half hours. Wounds at the upper margin united most rapidly with less scar. Wounds across the centre of the cornea and at the lower margin took longer to repair and made a larger scar. The rapidity with which the anterior chamber was re-formed suggested that, if during an operation on the eye where the presence of the aqueous was necessary, this aqueous were accidentally lost, the eye should be bandaged and the continuance of the operation postponed only for half an hour at the outside, instead of postponing it until the next day as was generally done. The experiments also showed the great influence that rest had on the process of repair, and emphasised the importance of keeping patients absolutely quiet for the first few hours after an eye operation. The President, commenting on the value of these experiments, said that their interest would have been still further increased if it could have been determined how soon a wound in the cornea, which had undergone primary adhesion, became impervious to the entrance of infective organisms. In reply to questions by Dr. Argyll-Robertson, Dr. Batten, Mr. Priestley Smith, and Mr. D. Marshall, Mr. Clarke said that the size of the wound was that of a moderate-sized keratome; the eyes were looked at within a few minutes of the incision, and conjunctival flaps had been avoided in order not to complicate the experiments.

Dislocation of Lens ; Couching ; Recovery. — Mr. T. H. Bickerton related a case of congenitally misplaced lenses, which became dislocated spontaneously into the anterior chamber. Couching was followed by recovery of perfect vision. The patient was a male, aged 28 years. He had been short-sighted since infancy. At 14 years of age he had attacks of giddiness, which caused him to fall and injure his forehead. At the age of 19 years he began to wear glasses : R. — 6·5 D., L. — 6 D. He was first seen in December, 1887. At that time the iris was tremulous ; the lens was dislocated into the vitreous in each eye : V.: R. c. + 10 D. = $\frac{6}{6}$; L. c. + 10 D. = $\frac{6}{24}$. On reading the refraction was entirely different : J. 1 at $3\frac{1}{2}$—4 in. ;

he looked through the displaced lens. In 1893 he suddenly went blind in the left eye, but the vision was restored next morning. He had two more attacks of the same nature afterwards ; during the last one eserine was used, and the eye did not recover as it had previously done. When seen after this occurrence in December, 1893, there was pain and congestion, and the clear lens nearly filled the anterior chamber. The unsatisfactory results obtained from extracting such lenses and the knowledge that these lenses had been tolerated so long in the vitreous, suggested to Mr. Bickerton the alternative of reposition. On December 30, 1893, this was done ; the pupil was dilated, an incision at the margin of the cornea was made with a keratome to evacuate the aqueous, and it was attempted to press the lens back through the pupil by the finger applied to the closed lids. This could not be done, and a spatula was introduced into the anterior chamber ; the lens then slipped back into the vitreous. Perfect recovery followed, and in June, 1897, three years later, the vision of the eyes was R. c. $+$ 12 D. $\frac{6}{5}$ partly, L. c. $\dfrac{+\ \text{12 D. s.}}{-\ \cdot 75\ \text{D. cyl.}} = \frac{6}{5}$. The interest of the case lay in the fact that blindness followed the use of eserine, which prevented the lens from passing back again into the vitreous, and the fact that the eyes have remained perfectly healthy, although the lenses have been dislocated into the vitreous for nearly four years.

The following cases and card specimens were shown :—

Mr. Adams Frost : Odell and Porter's Centreing Instrument for Ophthalmic Lenses.

Mr. Arnold Lawson : Leuco-sarcoma of the Choroid.

Dr. Rayner Batten : (1) Foreign Body found Impacted on the Optic Disc after Removal of Traumatic Cataract ; (2) Pulsating Tumour of the Orbit : ? Meningocele.

Mr. J. F. Bullar : Case of Deficiency of the Choroid.

Mr. Lang : Primary Syphilitic Lesion of the Inner Canthus.

ON THE ADVANTAGES OF REID'S PORTABLE OPHTHALMOMETER.[1]

By JAMES HINSHELWOOD, M.A., M.D.
SURGEON TO THE GLASGOW EYE INFIRMARY.

THE portable ophthalmometer invented by Dr. Thomas Reid, senior surgeon to the Glasgow Eye Infirmary, although it has been in daily use at that institution for several years, is unknown to the great majority of ophthalmologists. Associated with Dr. Reid for many years as his assistant, I have had a very special opportunity of becoming thoroughly familiar with the practical application of the instrument, under the personal guidance of the inventor. These facts, coupled with my knowledge of the great utility of this instrument, have induced me to record briefly some of the results of my experience as to its special advantages.

Reid's portable ophthalmometer is an instrument for measuring the curvature of the central area of the cornea. As this is the area utilised for distinct vision, the instrument supplies all the data practically requisite for the diagnosis and measurement of corneal astig-matism. Although we do not think, in a case of astigmatism, of prescribing glasses on the basis of the corneal measurements alone, but always have further recourse to other methods, which reveal the total astigmatism, such as the shadow test and the subjective testing with types, still a knowledge of the nature and amount of the corneal astigmatism is exceedingly

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[1] Read before the Ophthalmic section of the twelfth International Medical Congress at Moscow, August 25, 1897.

27

Ophth. Review. Vol. XVI., No. 193, November, 1897.

valuable by at once showing clearly one of the conditions with which we have to deal, by enabling us to analyse more precisely the different elements which contribute to form the total astigmatism, and by helping us to judge of the degree of improvement which may be expected in a given case. To be able to diagnose and estimate corneal astigmatism accurately and rapidly as can be done with this instrument, is, therefore, always a great practical assistance, and frequently a great saving of time, in dealing with, and prescribing for, cases of astigmatism.

For the explanation of the optical principles on which this ingenious instrument is based, and for a detailed description of the construction and method of using it, I would refer to the inventor's original paper[1] in vol. liii. of the Proceedings of the Royal Society.

I will simply briefly indicate a few points in the construction of the ophthalmometer so as to make my subsequent remarks intelligible. When the portable ophthalmometer is held in proper position with regard to the eye and the source of illumination, a double image of an object is formed at the virtual focus of the convex reflecting surface of the cornea, and is seen considerably magnified through a telescopic arrangement. The doubling is here effected as in the ophthalmometer of Javal and Schiötz, by means of a double image prism inserted between two achromatic lenses of equal focus, so that while the image is constant, the object is made to vary. Birefractive prisms giving images of 2 mins. and $1\frac{1}{2}$ mins. respectively have been selected as giving sufficiently accurate results for most practical purposes and the prisms can readily be

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[1] On a portable ophthalmometer by Thos. Reid, M.D., LL.D., communicated by Lord Kelvin, P. R. S., to the Royal Society, London. Received January 1, 1893, *Transactions*, vol. liii.

changed. The object is a circular disc, which can be made to vary in size by means of a carefully constructed iris diaphragm. The size of the object is therefore easily regulated, so that exact contact of the circular corneal images can be obtained in any meridian. By a simple contrivance the corneal images can be rotated through all the meridians of the cornea. If exact contact of the circles has been obtained in the vertical meridian, and the circles are found to overlap or to be apart from one another, when rotated into the horizontal meridian, then it is evident that there is a difference in the radius of curvature of these two meridians, and that corneal astigmatism exists. In the meridian, in which the circles do not touch, the size of the disc is altered by the iris diaphragm, so as to bring the corneal images into exact contact in that meridian also. The difference in the sizes of the discs necessary to secure exact contact of the images in each meridian, and also the corresponding value in dioptres is recorded on a graduated scale, attached to the instrument.

The present object, however, is simply to summarise briefly the results of my experience as to the peculiar advantages of the portable ophthalmometer. Its lightness, about 6 ounces in weight, its small size, 4 inches in length, and its consequent portability are enormous advantages. Occupying not much more space than an ordinary pocket ophthalmoscope, it can be conveniently carried about, used anywhere, and with the patient in any position, standing, sitting, or lying down.

The object lens of the instrument acting as a condenser the corneal images are sufficiently brilliant to be well seen even in very moderate light. Hence the instrument can be used with any form of illumination, either artificial light, or daylight, if it is moderately intense.

The circular form of the disc, and consequently the circular shape of the corneal images, is of great service in enabling the observer to recognise rapidly any asymetry, regular or irregular, of the cornea by the deviation of the corneal images from the circular shape. In regular astigmatism the images become oval shaped instead of circular, the amount of deviation from the circular form being dependent upon the amount of corneal astigmatism. The deviation from the circular shape is easily distinguished in all degrees of corneal astigmatism greater than half a dioptre. The major and minor axis of the ovals indicate respectively the meridians of smallest and greatest curvature, and their relative positions indicate whether the corneal astigmatism is with the rule, against the rule, or oblique, with the approximate angle.

When the astigmatism is irregular this is evidenced at once by the irregular distortion of the circular images. In cases of irregular astigmatism the results obtained are generally contradictory, because the patient seems to utilise a portion of the cornea out of the visual axis, where the surface is more regular, and may even refuse the cylinder indicated by the ophthalmometric measurement of the central area.

Conical cornea is shown at once by the smallness and great irregularity of the shape of the corneal images. In these cases the central area cannot be measured, its radius of curvature being too short and out of the range of the instrument. This central area being so irregular is not utilised for vision, and hence any information about the peripheral zones is of value. By means of the iris diaphragm we can rapidly vary the size of the disc, and the consequent changes of shape observed in the corneal images may afford valuable indications as to the refractive condition of the more peripheral parts of the visual area which may serve as a guide to treatment.

A high degree of precision is attainable with this instrument, so that a difference of from ·5 D. to ·25 D. can be readily appreciated. The magnification of the corneal images, their brilliance and clear definition enable the observer easily to make sure when they are in actual contact, or in the slightest degree overlapping or the reverse. When, however, the amount of corneal astigmatism exceeds 3 D. the spherical aberration introduces sources of error which give a result generally less than the real amount. In such cases a more correct result will be attained by substituting a 1·5 min. prism for the 2 min., and thus diminishing the spherical aberration by measuring with a smaller image.

There are a few difficulties experienced at first in the use of this instrument, but these initial difficulties are such as are necessarily associated with a portable instrument, and will be found to rapidly disappear with a little practice. With the ophthalmometers at present in use few difficulties of manipulation require to be overcome, as the patient's head is fixed, and the apparatus is mounted on a rigid stand. These, therefore, commend themselves by the ease with which they can be used by the beginner. This little portable ophthalmometer bears much the same relationship to the ponderous ophthalmometers in present use, as the modern pocket ophthalmoscope does to the old compound ophthalmoscope of former days. We are all familiar with the difficulties experienced by the beginner with the ophthalmoscope in acquiring a proficiency in the direct method of examination— difficulties of manipulation invariably associated with all instruments used by hand, but which gradually and entirely disappear with practice.

The difficulties experienced at first by those using Reid's ophthalmometer are chiefly two. First, it requires some practice to keep the instrument quite steady. This is most easily effected by resting on the

patient's brows the little finger of the hand grasping the ophthalmometer. The second difficulty is in focussing the instrument, so that the corneal images are seen with the maximum of clearness and definition. They will be seen with the maximum of clearness only in one definite position, *i.e.*, when the focus of the object glass of the instrument coincides with the virtual focus of the convex surface of the cornea. This point is found by beginning with the ophthalmometer held at a little distance from the eye and gradually approximating it, until the images are seen clearly and distinctly, then keeping it in that position.

The manœuvre necessary to realise these conditions requires considerable effort at first, but after some practice is accomplished almost automatically.

I have mentioned these initial difficulties in order to warn the beginner against judging too hastily of this instrument, should he perhaps at the first trial experience some difficulty in manipulating it. We have found, from a large experience with students at the Glasgow Eye Infirmary, that the awkwardness of manipulation and initial difficulties rapidly disappear with a little perseverance and practice.

H. CHALUPECKÝ. The Action of the Roentgen Rays upon the Eye and the Skin. *Centralblatt für praktische Augenheilkunde, August and September*, 1897.

It was not long after the practical application began of the recently discovered and mysterious Röntgen rays that it was found that prolonged exposure of the skin to their influence was apt to be followed by the occurrence of rather deep and slow-healing wounds. Thus in 1896 Destot published in *Lyon Médical* cases in which obstinate ulceration of the skin followed their application : as at the same time certain areas in the skin were anæsthetic he concluded that the lesions might probably be due to tropho-neurotic changes. Reviewing a whole series of cases, Forster (*Deutsch. Med. Wochenschrift*) comes to the conclusion that exposure of the hand to the rays for a period not exceeding half-an-hour or so does no harm : unpleasant consequences only follow prolonged or repeated exposures, so that a cumulative result is brought about. Otherwise it is a matter of individual susceptibility, much as is the case with exposure to sunshine. It is worth while to point out in this connection the stress laid by Bowler and by Fuchs upon the pigmentation of skin and formation of vesicles produced by prolonged exposure to sunshine upon snow-fields. Several observers have remarked also upon the depilatory action of the rays, and Freund has employed this quality in the treatment of a hairy nævus of the neck and back in a child. He allowed the rays daily for two hours to play upon the nævus, and on the tenth day was rewarded by observing the formation of bald patches with some fluid exudation ; in this case the cumulative effect seemed to be undoubted, while Freund was able, as he believed, to eliminate any influence of the electric rays. Similar cases have now been recorded by a number of others. These cases, as well as that of Bukovsky, who observed a similar condi- tion in his own person, remind one of Widmark's investigations of ten years ago, although these obviously do not have any reference to Röntgen rays, but to the

various spectral rays and their influence. The first part of his work dealt with the influence of light upon the anterior media of the eye. Exposure to a powerful light may produce central scotoma, atrophy of the retina and choroid. In cases of lightning stroke considerable irritation of conjunctiva and cornea have been noticed, and even formation of cataract. In snow-blindness one notices a similar condition, with the addition of corneal ulceration, and also after strong action of the electric light there is conjunctivitis and hyperæmia of the iris. Widmark suc- ceeded in showing that these actions were not due equally to all the rays of the spectrum, but were brought about chiefly by the ultra-violet. Through a lens of crystal, which permits readily the passage of such rays, he allowed light to play upon the eyes of rabbits, and thus produced chemosis, loss of corneal epithelium and irrita- tion of the iris lasting two or three days. It is in virtue of being rich in violet rays that the electric light is so apt to produce similar effects. The comparative impenetra- bility of glass by these rays explains the immunity obtained by the wearing of protecting glasses. Next to the electric light in point of richness in ultra-violet rays comes lightning. Under ordinary conditions sunlight is much poorer, but at high altitudes, and with a lowered temperature, it becomes richer—for example, in Arctic regions and when reflected from small powdery particles of snow. It is under these conditions that snow-blindness is apt to be produced, giving rise to symptoms of severe irritation of the conjunctiva and iris, with superficial ulceration of the cornea.

Widmark has shown, in discussing the action of ultra- violet rays upon the various media, that most of these are absorbed by the lens, although this itself only very rarely suffers from them—as however occasionally happens in lightning stroke. The same writer has also dealt care- fully with the action of these rays upon the skin ; it has been observed that sunlight, reflected from the great snowfields, is apt to give rise to Erythema Solare, of which the symptoms are reddening, swelling, and peeling. A

similar condition is produced in those who are employed in working with electric light ; and in those who have been struck by lightning, vesicle formation and desquamation of epithelium are observed also. Widmark believes that the ultra-violet rays are the cause of these manifestations in all the three conditions. Lastly, in this connection there is the occurrence of cataract (as already mentioned) after lightning stroke, which also Widmark attributes to the action of the violet rays ; and he believes that the reason of the lens suffering rather than the cornea, &c., is that in the lens the chemical energy of the violet rays is transformed into light-distributing. The lens has been observed to fluoresce when ultra-violet rays play upon it. Similar fluorescence is seen under the same conditions in the retina, but since these rays are absorbed by the media under normal conditions it is invisible.

Ogneff has experimented with frogs, pigeons, and rabbits, by reproducing the conditions under which certain persons work, thus, he exposed the animals to a powerful electric light at a distance of $\frac{1}{2}$ to 2 inches, and found that rabbits stood the investigation badly ; the conjunctiva became inflamed and ulceration of the cornea occurred. Microscopic examination showed changes in the nuclei of the cells, varying in degree from karyokinesis to necrosis ; the lens and vitreous were unaffected.

Chalupecký accepts the analogy between the actions of the ultra-violet and Röntgen rays ; the browning of the skin under the conditions which give rise to snow-blindness and after exposure to the x-rays (which has been repeatedly observed) may be regarded as a natural defence against the evil influence of the ultra-violet rays. It is to be remembered, too, that there are certain analogies between the two sets of rays : both have very short wave lengths, in the case of ultra-violet rays 100 $\mu\mu$ $\left(1 \quad \mu\mu = \frac{1 \text{ mm.}}{1 \text{ million}} \right)$; in the case of Röntgen rays 14 $\mu\mu$ only ; both display strong chemical action, both fluoresce under certain conditions, and both are to a limited degree absorbed by certain media, the ultra-violet rays more

readily than those of Röntgen. Of course they differ also in certain important particulars : ultra-violet rays are reflected from polished surfaces in the normal fashion, Röntgen rays irregularly ; ultra-violet rays are refracted in denser media, but not Röntgen rays ; and similarly with the phenomena of polarisation. Lastly, crystal permits the passage of ultra-violet rays and black paper arrests them ; the opposite is the case with Röntgen rays.

Such was the state of our knowledge when Chalupecký attacked the subject, experimenting with rabbits, this animal being particularly susceptible, as has already been shown, to the various actions of the ultra-violet rays. Since Röntgen rays exert so powerful an influence upon the skin, and since their analogy with ultra-violet rays is so marked, it was likely that the Röntgen rays would have some influence also upon the delicate structures of the eye— a probability now confirmed by actual observation. The author started with the following points :—(1) If Röntgen rays are absorbed by the lens in a similar fashion to the ultra-violet (which cannot pass through it), then fluorescence will probably be shown. (2) If the lens is impenetrable to Röntgen rays then it must cause a shadow on a photographic plate if interposed in their path, much as a bone does. (3) The author wished to make sure how far the cornea and other parts of the eye show fluorescence. (Under the influence of ultra-violet rays the cornea shows little fluorescence, the iris and conjunctiva almost none, but the lens and retina exhibit this appearance freely.) (4) The special aim of the investigation was simply to establish what the action upon the eye may be—a point not hitherto enquired into. While actually engaged in his investigations the author's attention was drawn to a paper by Brandes and Dorn upon the visibility of the Röntgen rays, in which certain of these points were dealt with and certain conclusions drawn, some of which were and some were not in accordance with Chalupecký's results. These authors first of all tested the human lens in reference to its penetrability and also the aphakic eye of a girl from whom the lens had been extracted for the cure of myopia, and

found that the patient experienced a sensation of light. But when the observers themselves directed their gaze to the Röntgen apparatus they also experienced a sense of light. Thus, if the rays fell in the direction of the axis of the eye, there appeared to the observers a light ring at the periphery of the field of vision, which was broadest at the temporal side ; and when a lead plate (impermeable of course to these rays) was moved in the path in a direction from above downwards, this light sensation appeared first below. When an aperture 2 mm. in diameter in this lead plate was held exactly in front of the pupil so that rays could only enter the eye by way of the pupil no ring was perceived ; when the aperture was enlarged to 4 mm. in diameter the ring of light again appeared. When a small lead disc was fastened against an aluminium plate and held in front of the eye, light was again imperceptible. Photographic pictures were made of the whole eye of the pig by means of Röntgen rays, and no shadow was cast by the lens. Apparently, then, the lens does not choke the passage of the rays ; they are absorbed to a greater extent by the vitreous humour, less by the cornea and other membranes.

With reference to the influence of the rays upon the retina, the investigations show they pass through the eye unbroken ; the light sensation one can therefore explain by fluorescence of the lens or other of the media, which thus stimulates the retina ; or else the retina, being itself rendered fluorescent, stimulates itself. The authors regard stimulation by the fluorescence of the anterior parts of the eye as out of the question, because when the lead plate was moved from the temporal side in front of the eye no light sensation was produced over that region in which the ciliary body and the lens were still played upon by the rays. That the lens is permeable the authors conclude from the fact that when the aperture in the lead plate is 4 mm. in diameter light is perceived, though the diameter of the lens is 8 mm. Attempts made, with all due precautions against error, to discover traces of fluorescence of the individual portions of the eye were quite unavailing.

As regards the fourth point – the general action of the rays upon the eye—the investigations have as yet been chiefly confined to the lower animals, and therefore the results attained may require confirmation. The mode of making the experiments was sufficiently simple :— The animal, a small sandy rabbit, was placed in a metal box with only the head protruding, without any pressure or discomfort to the animal, so that it remained quiet for a couple of hours at a time. The Röntgen focus lamp was placed at a distance of about six to ten centimetres from the right side of the head. It is to be remarked at the outset that the temperature in the neighbourhood of the lamp was never raised, and that the glass was hardly warm after an exposure of two hours. The energy was supplied by a battery of ten elements, whose power varied from twelve to sixteen ampères or rather over it ; the spark made a leap of more than twenty centimetres. The action of the lamp was tested with a shield impregnated with platino-cyanide of barium ; the bones of a hand and even those of the animal's skull were distinctly to be made out. The exposures lasted for three-quarters of an hour to two hours daily or every second day. This went on from May 5 to 14 of this year, only a slight contraction of the pupil occurring, with occasionally a watery discharge from the conjunctiva. On the latter day, and still more distinctly on the next, after an exposure in all of thirteen hours, there was found a certain moisture of the skin from the angle of the mouth to the nostril on the right side, extending—though to a less degree—to the angle of the eye. At the same time signs appeared of inflammation of the conjunctiva of the globe, hyperæmia and swelling of the eyelids, with contraction of the pupil, all on the right side. Since this contraction persisted and there was therefore some reason to fear that the rays were not perhaps entering the eye properly, atropine was instilled so that the pupil was kept moderately large, though not fully dilated.

On May 20 there was more secretion ; the lids were glued together, the edges reddened and swollen, mucus was float-

ing about the cornea ; in spite of the atropine the pupil was
contracted, though higher than it was broad. As regards
the eye, the condition was much the same but with
greater photophobia and a tendency to closure of the lids.
Thus things went on, and on May 29 the whole right side
of the face was found to be denuded of hair from chin to
vertex and from mouth to ear, the skin covered with a
slight, easily detached crust, which when removed caused
a little bleeding. The eyelids were much swollen and
gummed together, and when they were forcibly opened
muco-pus gushed out in abundance. Chemosis was pre-
sent, the cornea slightly dull, the pupil small, the interior
of the eye normal. A day or two later the cornea became
dull and stippled, especially in the upper outer quadrant ;
it was almost impossible to examine the fundus, and half
of the head was almost quite bald. Gradually a dense
greyish opacity of the whole cornea, even of its deepest
layers, became manifest, preventing any trans-illumina-
tion. The exudation from the eye diminished in quan-
tity but became more tenacious and pseudo-membranous :
the palpebral aperture became reduced in size by the
gradual development of a symblepharon. The whole ap-
pearances of the eye suggested strongly those produced
by burning, as caused by such a diffusible substance as
ammonia. It is to be observed that all these changes
occurred only on the right or exposed side of the head ;
the aggregate period of exposure after eighteen sittings was
almost exactly twenty-four hours ; the animal's state of
health in general was perfect. Thus, so far as one experi-
ment goes, the fourth question propounded for settlement
is answered : the Röntgen rays, that is, exert a
powerful and destructive influence upon the eye, chiefly
upon the anterior portions, conjunctiva and cornea, less
upon the iris. As to the influence upon the deeper lying
parts, further microscopic examination is required. Ap-
pearances suggest that the influence of the Röntgen rays
resembles that of a powerful chemical irritant.

On the question of the fluorescence of the lens and cornea,
Chalupecký states that he failed, like Brandes and Dorn,

to find any, although he endeavoured to trace it by means of the protected Röntgen lamp in complete darkness, employing lenses extracted from living eyes. The question of the penetrability of the lens by Röntgen rays is a difficult one to settle. Brandes and Dorn found, as above mentioned, that an aphakic girl experienced light sensation when exposed to the rays ; but then so did the experimenters. One of them, however, who was aphakic in one eye, thought he felt the light sensation more intensely with that eye. This, however, is not very conclusive evidence. The light sensation produced by the Röntgen rays is manifest chiefly about the periphery of the visual field—does this not point to the impenetrability of the central portions of the lens ? This seems even more probable when it is remembered that if a metal plate with small aperture was held before the eye no light was perceived, and only when the opening was sufficiently large to leave exposed some of the more peripheral parts of the lens was any sensation experienced.

Photographs were taken by the rays, the lens, the whole eye, and the cornea (cut from the fresh eye of a pig), being laid upon a plate carefully wrapped in black paper, when it appeared that the shadow cast by the lens was very nearly as dark as that cast by the whole eye, while that cast by the cornea alone was much feebler— with short exposures, such as seven minutes, it was indeed almost invisible.

On the above grounds Chalupecký believes we are justified in concluding that the lens absorbs Röntgen rays to a large extent, perhaps nearly or quite as much as the vitreous humour, for which reason the attempt to distinguish between the shadow of the lens and that of the vitreous was not successful. Of course the lens is not by any means quite impenetrable, not nearly so much so as metal.

The results of this preliminary investigation may thus be stated ;—

(1) The irritation produced by the Röntgen rays upon the anterior parts of the eye is yet another point of resemblance between these rays and the ultra-violet.

(2) Röntgen rays are not so harmless as some have supposed ; on the contrary, they have an intense and injurious action upon the eye and the skin. The effects do not appear at once, but become worse the more protracted the exposure—a cumulative effect.

(3) Röntgen rays are absorbed by all the media of the eye ; slightly by the cornea, more by the lens and vitreous humour.

(4) The action of these rays upon the posterior parts of the eye is still undetermined.

(5) The fluorescence which Widmark regarded as a means of protection of the deeper parts of the eye from their noxious influence in the case of the ultra-violet rays, is not observed in the case of Röntgen rays.

(6) The action of the Röntgen rays is primarily of a chemical nature, perhaps in a secondary degree tropho-neurotic.   W. G. Sym.

L. DE WECKER (Paris). Optical Tattooing of the Cornea. *Annal. d'Occul., T. cxviii., p.* 88.

A. LANGIE (Cracow). Tattooing of Cornea to Improve Vision. *Recueil d'Ophtal., September,* 1897, *p.* 515.

Tattooing of corneal leucomata has been practised for many years—indeed for centuries—as a cosmetic operation, but it is only of late that the optical advantages of the proceeding have been more or less generally recognised. According to de Wecker a marked improvement in visual acuity follows after tattooing those very faint nebulæ which are hardly visible except by focal illumination, while in cases of denser opacities he finds tattooing often much superior in its optical results, *i.e.*, in raising visual acuity, to iridectomy. The results of iridectomy in cases of central leucoma corneæ are often extremely disappointing, and

even the more effective operation of sphincterotomy frequently produces very slight improvement in vision; when tattooing is properly done in such cases the results *quoad* visual acuity are in de Wecker's experience always decided. He prefers a single needle for the operation, a cataract needle or ordinary sewing needle, and lays stress on the importance of having the Indian ink solution of such a consistency that it does not drop off the needle or flow over the cornea. The nebula should first be neatly marked out by a circle of dots which are then to be joined into a line, and in doing this, electric light and focal illumination are desirable. The whole of the enclosed space is then tattooed of a uniform and intense black. In order to avoid unnecessary injury to the corneal epithelium, the needle must not be inserted obliquely, and all rubbing must be avoided for a similar reason. An additional advantage of this proceeding is that it can be done to eyes which are not in a sufficiently healthy state to undergo an iridectomy.

Langie, on the contrary, urges that the punctures should be made as obliquely as possible. He follows Czermak as to the indications for the operation : (1) as an adjunct to iridectomy in cases of leucoma ; (2) in delicate semitransparent central nebulæ where iridectomy is useless ; (3) in keratoconus after cauterisation. Langie records the details of two cases. In the first vision was raised from $\frac{6}{24}$ to $\frac{6}{12}$, which was the amount of the acuity with the stenopaic slit ; in the second the improvement reached from a bare $\frac{1}{60}$ to $\frac{6}{60}$. Langie records also the good results he obtains from douches of steam as practised by Galezowski in cases of nebulæ of tolerably recent origin.

J. B. S.

A HOCHE (Strassburg). The Etiology of Choked
Disc. *Arch. of Ophthalm.*, *xxxv.*, 2 *and* 3, *p.* 192.
(German Edition.)

The etiology of choked disc is still a much discussed
question. The " mechanical " theory attributes the changes
in the optic nerve to the stasis in the lymphatic vessels,
while the " inflammationists " make the presence of toxines
in this lymph responsible for these pathological changes.

It seems, however, as though the mechanical theory
begins to gain more and more ground. In this respect
observations from the field of neurology have contributed
to strengthen the position. For on the one hand " toxines "
have never been found in the cerebro-spinal fluid ; on the
other, all the symptoms of choked disc, if not too far
advanced, vanish completely as soon as the intra-cranial
pressure disappears.

Any corroborative evidence, even if only based on the
analogous behaviour of nervous tissues of simpler con-
struction, must therefore be considered a welcome support.
In this direction it has been found that in cases of intra-
cranial pressure the optic nerve is not the only nerve
undergoing degenerative changes, but that degeneration
also takes place quite constantly in the posterior roots of
the medulla. This observation has only recently been
brought to light by means of Marchi's osmic acid method.
The great advantage of this method consists in its delicacy,
so that very slight degenerative changes, even in the
earliest stages, are thereby clearly shown.

In all cases of intra-cranial pressure in which choked
disc was present, a more or less well marked degeneration
of the posterior spinal roots could be demonstrated by the
osmic acid method.

Of great value are in this respect two cases observed by
Pick. In the one case of choked disc with intra-cranial
pressure, but without cerebral tumour, the posterior roots
were affected, while in the other with cerebral tumour, the
posterior roots were free and there was no sign of choked
disc to be seen.

28

Pathological changes are met with in all parts of the medulla, though they are most strongly marked in the cervical region.

The posterior roots themselves are, however, not affected to the same extent in all parts of their course. It is well known that the nerve fibres are anatomically and trophically connected with the spinal ganglia ; between the latter and the medulla, *i.e.*, in their course through the spinal fluid, they have a medullary sheath which ends abruptly at the point where they pass in an oblique direction through the pia mater.

Both longitudinal and transverse sections of this part show the nerve fibres circularly constricted by the dense fibres of the pia, thereby producing a condition resembling the lamina cribrosa of the optic nerve.

The posterior roots form one of the outlets of the lymph of the medulla, and it is significant that in the majority of cases of intra-cranial pressure the degenerative changes are limited to the intra-spinal portion of the nerve fibres. When the pressure continues for a long time, the degeneration may travel upwards into the posterior columns and finally resemble the pathological appearances of locomotor ataxy.

As for the effect of " toxines " possessing specific poison- ous qualities, there is not a vestige of proof forthcoming of their existence. There remains therefore as the only explanation the mechanical effect of pressure transmitted from the cranium to the spine through the medium of the cerebro-spinal fluid.

In this respect it is worth noting the difference in the direction of the nerve degeneration in the optic nerve on the one hand and the posterior roots on the other. If pressure occurs, say in the lamina cribrosa, both a centri- fugal and a centripetal degeneration will start from this spot, because the optic nerve fibres are partly the continuation of the retinal (peripheral) and partly of the cerebral (central) ganglia. In the posterior spinal roots, however, all the nerve fibres are under the same trophical control, and any circumscribed compression produces degeneration in one direction only.

All hitherto examined cases of the early stages of choked disc show a complete analogy with the histo-pathology of degeneration in the spinal nerve fibres in cases of mechanical pressure, such as the occurrence of medullary varicosities, the breaking up of the medullary sheaths, and emigration of round cells filled with granular detritus. None of these conditions justifies the name of "neuritis"; the latter has probably been chosen on account of the ophthalmoscopic appearance, although even in this respect the complete and constant absence of arterial hyperæmia seems quite incompatible with the idea of inflammation.

K. G.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Mr. H. R. Swanzy, President, in the Chair.
Thursday, October 21, 1897.

The President gave his introductory address as follows :—Gentlemen,—In electing me to be president of this great Society you have conferred on me the highest honour at your disposal, an honour of which anyone in our profession might well feel proud. In placing me here, moreover, you have added my name to a list which commences with William Bowman, and continues with Jonathan Hutchinson, John Whitaker Hulke, Hughlings Jackson, Henry Power, Argyll Robertson, and Edward Nettleship —names to be brought into association with which is in itself a high distinction. Again, in making me your president, you have made me, for the time, the titular head of the profession of ophthalmology in these countries, and I may say, in Greater Britain also, for our membership extends to most of those who practise ophthalmology in India and

the Colonies. And when I remember the great men who in years now long gone by, were the pioneers of that profession, and of the no lesser men who in more recent years, added by their good works to its fame and reputation ; when I think, too, of the many able and well-known men who fill the ranks of that profession at the present time, I feel that to be its titular head is indeed a distinguished position. These considerations, or any of them, would be enough to render this office one which might well satisfy ambition. And yet its greatest charm is to be found in something else. The greatest charm of this office for me, as it has been for those who have gone before me, and as it will be for those who may follow after me in the long vista of future years, the greatest charm of this position lies in this, that the constituency which elects to it is composed of the very men, the fellow workers, the special colleagues, who must be deemed the most competent to discern whatever of good there may be in any of their brethren. That being so, why your choice has fallen on me I know not. Nor is it for me to criticise your action, even could I do so dispassionately. My duty is a pleasanter one, for it is to thank you most gratefully for your goodness and generosity to me, and were I to give you an all-night sitting, I could not say more than that I thank you with all my heart.

One word more before I leave this part of my address. There is one point of view from which, without egotism, I can sincerely rejoice at the selection you have made ; for that selection shows, for the second time and in the same marked manner, that this Society is conducted in no narrow spirit of metropolitan exclusiveness, but rather in that wider and wiser spirit, which recognises at least the possibility of there being some merit to be found outside the four-mile circle.

I should be glad to close here and to allow the Society to proceed with the other agenda of the meeting, which include some important communications. But it has been customary for an incoming President to devote part of his opening address to the consideration of some subject of

professional interest, and I am not prepared to assume the responsibility of breaking away from this custom. At the same time I confess I think that in these days, when there is so much bad writing and so little good reading, an introductory presidential address is apt to promote the former vice, for its intrinsic difficulties are well-nigh insuperable.

I propose this evening to pass in short review some of the congenital anomalies of the eye as illustrated in the *Transactions* of the Society. I had hoped to draw attention to most, if not all, of the communications which have been made in this department, but I soon found that this would be impossible within the compass of my address, and I shall therefore confine myself to congenital anomalies of motions of the eyeball, coloboma of the iris, and a unique case of microcephalus and proptosis.

An exceedingly interesting class of communications in our *Transactions* are those which treat of

The Congenital Anomalies of Motion of the Eyeball.—These are of two kinds—the so-called associated motions of the eyeball, and the congenital defects of motion of the eyeball. Of communications which treat of associated motions of the eyeball there is one by Mr. Marcus Gunn (vol. iii., p. 283), one by Mr. Browning (vol. x., p. 187), and two by Dr. Sidney Phillips (vol. vii., p. 306).

Mr. Marcus Gunn's case was a remarkable one. In it it there was ptosis of the left eyelid, but when the external pterygoid of the same side was put in action, as in the act of chewing, the relaxed levator contracted, and the left lid was raised quickly and powerfully, this position being maintained so long as the jaw was kept drawn to the right. Notwithstanding the ptosis, the patient could but imperfectly close the eye. The committee of experts appointed to examine Mr. Gunn's case consisted of Sir William Gowers, Dr. Stephen Mackenzie, Mr. Lang, and Dr. Abercrombie. They reported their opinion to be that the levator was innervated both from the third nerve nucleus and from the external pterygoid portion of the fifth nerve

nucleus. Inasmuch as innervation of the levator was imperfect, the committee held it might be assumed that some of the fibres of the levator palpebræ portion of the third nerve arose, not from the third nerve nucleus, but from the fifth nerve nucleus. This would explain the action of the levator in association with the external pterygoid as well as the ptosis. The fact that the levator did not relax perfectly when the eyelids were closed might, the committee thought, be accounted for by its partial innervation from the fifth nerve nucleus. This theory of the case seems a reasonable one; it is, at the least, the best working hypothesis out of several which have been offered, and an hypothesis we must have, so long as we have no means of attaining a definite knowledge of the cause. I know of only one other case of precisely the same kind on record,[1] although there are a good number of cases reported in which, not merely with lateral motions of the jaw, but also with certain other motions of the jaw, the drooping eyelid was violently raised.

In Mr. Browning's case, when the patient looked either to the right or to the left the upper lid of the side towards which he looked drooped, while that of the opposite eye became slightly elevated. On convergence both upper eyelids were raised above the horizontal; in short, contraction of either external rectus was accompanied by drooping of the upper eyelid of its own eye, while contraction of either internal rectus, in lateral motions or in convergence, caused elevation of the upper eyelid of its own eye.

Dr. Sidney Phillips's two cases were brothers. In them, on looking to either side, it was the upper lid of the eye away from the side towards which the eyes were directed which drooped to almost complete ptosis, while the upper lid of the other eye remained raised. Dr. Phillips thought that there was here an usually close commissural connection between the nuclei of origin of the two third nerves, as a consequence of which simultaneous relaxation of the

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[1] Schapringer, *New York Med. Monats.*, January, 1893.

internal rectus and of the levator palpebræ superioris, took place, instead of relaxation of the former alone.

In the OPHTHALMIC REVIEW for October, 1895, there is a paper. by Mr. Walter Sinclair on Abnormal Associated Movements of the Eyelids, which is well worth reading, and in which the author gives a summary of all such cases published up to that date, and to these he adds five hitherto unpublished ones.

In the foregoing cases we see there was no want of power in any of the orbital muscles. We now come to the other class of cases in our *Transactions*, in which such want of power is the leading feature ; of these there is one by Mr. Mackinlay (vol. vii., p. 281), five by Mr. Lawford (vol. viii. p. 262, and vol. xii., p. 172), one by Mr. Donald Gunn (vol. xiii., p. 150), and one by Mr. MacLehose (vol. xvi., p. 299).

Mr. Mackinlay's case was one of complete paralysis of each external rectus. The position of each eye was convergence, and there was no diplopia. It is not stated whether or not there was binocular vision in any part of the field.

Mr. Lawford's four cases, which appear in our eighth volume, were a father, one son, and two daughters, out of seven children. In the father there was complete bilateral ptosis, no upward and very little downward motion in either eye, restricted lateral motion, and no action of the obliques. The interni acted better for convergence than in lateral motions. In one of the children there was complete bilateral ptosis, and no upward or downward motion of the eyeballs. The usual position of the eyeballs was conjugate deviation to the right. On an attempt to look up, the eyes were turned inwards and the vertical axis rotated outwards. On an attempt to look downwards slight outward movement is produced, but without rotation of the axis such as would accrue from action of the superior oblique. There was moderate outward movement of both eyes, and convergence was possible to some extent. The most extraordinary effect was produced when he was told to look to the left, for then, while he did succeed in turning

his left eye outwards, its fellow, instead of turning inwards, turned outwards also; in short, both external recti were thrown into action simultaneously. This meant, as Kunn points out, that the muscles were normal but the co- ordination of the motions deranged. In another child there was almost complete bilateral ptosis, and complete loss of upward motion in both eyes. In the right eye the lateral motions were fair, and there was slight downward motion. In the left eye there was slight inward motion, no outward motion, and no downward motion. The power of convergence was fair. In the third child there was com- plete bilateral ptosis, total want of upward and downward motion, and no lateral motion either conjugate or separate, yet there was a moderate amount of power of convergence. On an attempt to look either up or down, slight con- vergence was produced. There was no diplopia in any of these cases, but there is no statement as to whether binocular vision in any part of the fields was present. In none of them was there any other congenital defect in the system.

Mr. Lawford quotes several writers on the subject, amongst others Heuck, whose cases were very similar to his own, and in one of which a *post-mortem* examination was obtained. This *post-mortem* showed that the orbital muscles, with the exception of the internal recti, were all inserted into the sclerotic in abnormal positions. In addition to this displacement, nearly all the muscles were too short, but, with the exception of the internal recti, they were well developed. The orbital nerves were in all respects normal.

Mr. Lawford says the abnormality, both in length and in the sites of their insertion, which the ocular muscles may present in these cases, renders it impossible to give any reasonable explanation of the curious movements noticed in some of them, such as the rotation of the eye which occurred in his second case, when presumably the internal rectus alone should be acting. Dr. Carl Kunn, in his admirable monograph,[1] offers the following explana-

[1]*Die angeboren Beweglichkeitsdefecte der Augen*, p. 45; Deutschmann's *Beit. z. Augenhlk.*, xix Heft. 1895.

tion of this phenomenon : in the normal upward motion of the eyeballs the superior rectus and the inferior oblique become innervated. In Mr. Lawford's case the superior recti were powerless, but the inferior obliques were active, as were also the internal recti. A desire to look up produced a nervous impulse which could not be expended on the defective superior rectus, and therefore it was concentrated on the normal muscles ; hence the convergence (action of the internal rectus) combined with the outward rotation of the corneal axis (action of the inferior oblique).

In our twelfth volume, Mr. Lawford records another congenital case in which there was ptosis of the left eye, the eyeball being divergent and rotated down. The right eye was normal. He noted that when the right eye was covered the left eye came to fixation by an upward and inward motion. The eye could be turned inward almost fully, but upwards only to the horizontal position. When the normal right eye was screened and the left was turned up to the utmost, the right eye, under the screen, was found to be rotated upwards in an extreme position. There is no statement as to the presence or absence of the power of convergence, or of binocular vision.

Mr. Donald Gunn narrates the case of two brothers with almost complete ophthalmoplegia externa, slight power of upward and downward motion being the only one present. There was incomplete ptosis.

Mr. MacLehose describes a case of paralysis of the left external rectus. In the same eye the inward motion was not perfect, while the upward and downward motions were full. The right eye was normal. When the patient looked to the right a phenomenon occurred which, so far as I know, is unique. The left eye, namely, became retracted into the orbit to such an extent that a clear intervening space was left between the globe and the posterior surface of the lower lid at the outer part, while the palpebral fissure became narrowed by contraction of the orbicularis. Mr. MacLehose adds : " Although I have spoken of paralysis of the sixth nerve, yet it is quite possible the limitations of

movement may depend on an anomalous nerve distribution, or possibly an absence of the muscle itself. I can offer no satisfactory explanation." In the discussion which followed Mr. Holmes Spicer mentioned a case under his care in which the right eye was on a higher level than the left, and when the patient looked to the left the right eye went completely upwards. There was disturbing diplopia, and it was decided to divide the superior rectus. The insertion of the tendon was not found in its normal position, but far to the outer side towards the external rectus. If the same abnormal attachment had been present in the inferior rectus Mr. Holmes Spicer said the effort of both muscles acting together would doubtless have been to pull the eye backwards into the orbit, and he suggested that some such arrangement may have existed in Mr. Mac-Lehose's case.

We should like to know what the nature of the congenital lesion may be which causes these defects of movement of the eyeballs. Besides Mr. Holmes Spicer's case and Heuck's case, there are many others in the literature, in which, mainly during operations designed to correct the defect, or else *post-mortem*, irregularities in the musculature of the eyeball were found, which were adequate to account for its defective mobility; and Mr. Lawford, too, states that, so far as published records up to 1888 showed, these defects of motion are almost always due to developmental anomalies affecting the ocular muscles, which are found to be either quite absent, or ill-developed, too short, or abnormally inserted, and that, except in cases in which there is gross defect in the nervous system, the nerves supplying these muscles are not at fault. This, he also says, is the opinion expressed by our standard textbooks; in fact, but few authors mention the possibility of absence or incomplete development of these nerves.

It is certain that while many of these cases are due to irregularities in the orbital muscles, they are not by any means all due to them, for instances of congenital motor defects of the eye are on record in which those muscles were found to be absolutely normal in every particular.

We are, then, in such cases thrown back on the nervous supply for the cause. Moebius, Siemmerling, and other distinguished neurologists regard an intrauterine atrophic degeneration of the nuclear origins of the nerves as the primary cause, and in those cases where orbital muscles are imperfectly developed, or wholly wanting, such authors ascribe their condition as a consequence of the nuclear alteration.

But nuclear degeneration has been actually found in but one case of Siemmerling's, and even that one is open to criticism. In a case of Uhthoff's the nuclei were found to be absolutely normal. It is true that in but a few cases was the opportunity offered of a microscopical examination of the nuclear region.

As regards the trunks of the nerves I know of no observation indicating them as the site of the lesion, but we may not yet dismiss from our minds the possibility of its occasionally being there. That the lesion may be in the cortex, or in the path between it and the nuclear centres, will have to be considered in any case in which muscles, nerves, and nuclei are found normal ; and the evidence to hand shows that such cases are likely to turn up.

There are many exceedingly important points in connection with the diagnosis of these congenital defects of motion, which the time at my disposal will not permit me to go into. Anyone who is interested in the subject should read Dr. Carl Kunn's monograph, which I have already mentioned. But I may be permitted to refer to one or two peculiarities of these defects of motion ; it is hardly correct to call them paralyses. Let us take one of the most common and simplest cases—congenital loss of power in the external rectus. In acquired paralysis of the externus the eye is invariably found convergent ; this is not always so in congenital loss of power of the external rectus, for the eye is often found, in the primary position, to be quite straight. In such a case, too, if the good eye be covered and the patient be required to look towards an object to the side of the affected eye, he of course cannot rotate the latter in the desired direction ; but it will be found that the covered

eye, too, has not moved in that direction, as it would do in the case of an acquired externus paralysis. No conjugate motion of the eyes towards this side having ever been acquired, the sound eye in this experiment had no incentive to direct its visual axis towards the object once it had been deprived of the power of seeing the latter. As soon as it is uncovered it is directed straight at the object, and then it will be found there is no tendency to over-action in its internus, as there would be in an acquired case.

Again, in some cases of bilateral loss of power in the externus, but without loss of power in either internus, the eye will not be moved from side to side at all, the interni never having learned to be associated with the externi in this action, although the interni do act together to bring about convergence. Furthermore, even in cases of congenital loss of power in each external rectus, there may be parallelism of the optic axes, and not convergence.

I shall now pass on to the papers on " Coloboma of the Iris."

In Mr. Arthur Benson's case (vol. iv., p. 351) there was a coloboma of the iris below in one eye, a bridge of iris tissue connecting its pillars half-way down. There was also a coloboma in the lens corresponding to that in the iris, and a coloboma of the choroid.

Mr. Phillip's case (vol. xi., p. 219) was one of complete coloboma of the iris in the right eye, with a small coloboma of the choroid and lens, and cataract. The left eye was of small size, and in it there was incomplete coloboma of the iris, and a large coloboma of the lens, which was partially opaque. There was a large coloboma of the choroid and of the macula lutea.

In Mr. Doyne's case (vol. xi., p. 220) there was coloboma of the iris and choroid, with a curious bulging of the corresponding part of the lens.

Mr. Work Dodd (vol. xiv., p. 210) gives a case of coloboma of the iris and choroid in one eye, which was of small size, with remains of the hyaloid artery. The iris coloboma was downwards and inwards, and was incomplete, there being some fenestrated iris in the angle of the cleft.

There were some remains of the pupillary membrane. Except in the coloboma the reaction to light of the pupil was good, but it did not react on accommodation. There was a large choroidal coloboma below, which included the optic disc.

Mr. Lang, in vol. x., p. 106, and Mr. Treacher Collins in vol. xiii., give us important papers on one and same case. The patient was under Mr. Lang's care. He was aged 36, and was almost blind from glaucoma in each eye. In the right eye there was a coloboma of the iris horizontally outwards, involving one-fourth of the iris. The lens was notched opposite the coloboma. Mr. Lang mentions that Manz lays stress on the fact that the fœtal iris, unlike the choroid, has no cleft, and consequently cannot retain one ; and that Manz points out where, as in a case of his, a choroidal coloboma is found on the temporal side, as well as on the nasal side, some explanation, other than the failure to close the fœtal fissure, must be sought for, and Mr. Lang thought that Deutchmann's hypothesis of an intra-uterine inflammation becomes applicable in many cases. The glaucoma in this eye, Mr. Lang said, was difficult to explain, the theory that iridectomy is a safe- guard against glaucoma being apparently negatived by it. A possible explanation, he thought, might be that the trabecular tissue constituting the spaces of Fontana may have been absent in this case at the coloboma, and the available space for filtration of lymph would therefore have been smaller here than in a normal eye, and hence the liability to glaucoma greater.

This eye subsequently became painful, and Mr. Lang was obliged to excise it, and he gave it to Mr. Treacher Collins for pathological examination. Mr. Collins found the iris absent on the outer side, but the ciliary body was present in that position. On the inner side the root of the iris was in contact with the posterior surface of the cornea, blocking the filtration angle. The case, Mr. Collins said, presented some points for consideration. First, the unusual position—namely, outwards—of the iris coloboma. It is frequently, and Mr. Collins thinks wrongly, assumed that

a congenital deficiency of the iris must necessarily bear some relation to the ocular cleft. But, in another remarkable paper on irideremia in this same volume (vol. xiii., p. 128), Mr. Collins showed that the development, not merely of a part of the iris, but of the whole of that organ, may be arrested by abnormal adhesions or late separation of the cornea and lens, preventing the ingrowth of the iris ; and if this abnormal adhesion or late separation happened to be confined to a portion of the circumference in one or even in two directions, a coloboma, or even two colobomata, might be produced in any direction.

The occurrence of glaucoma in an eye with congenital iris coloboma is remarkable. But here at the coloboma there was a rudimentary iris, as also in Mr. Collins's case of aniridia, which was intimately adherent to the ligamentum pectinatum, and Mr. Collins is of opinion that this adherence was congenital. It then only remained for the root of the iris in the rest of its circumference to become pushed forward in order to bring on high tension. Mr. Collins says he does not agree with Rindfleisch in ascribing intrauterine inflammation beginning in the choroid and extending forwards, and causing perforation near the corneo-scleral margin and escape of aqueous, as the primary cause of the abnormal contact. In this specimen no sign of perforation was present. Again, the corneo-scleral margin is an unusual seat for a perforation. Furthermore, it is unlikely that a bilateral condition, such as aniridia usually is, would be caused in this way. And, finally, it is unnecessary to resort to this explanation, for at the period when the iris is developing, there is no anterior chamber, and hence the lens capsule and the cornea are in contact, the anterior fibro-vascular sheath alone intervening.

And now, in conclusion, I desire to direct your attention to a remarkable case of Mr. Henry Power's, in vol. xiv., p. 212, under the title of, " A Case of Microcephalus and Proptosis."

The case was that of a female child born at full term, after an easy delivery, and you will remember the remarkable picture given of the infant's face and head. It died

when about a month old. The head was misshapen, and the eyes were both projecting to so great an extent that the margins of the lids were far behind the equator of the globes. The globes could not be pushed back, but the eyelids could be pulled forwards, and made to meet in front of the eyes. The head was very short in the antero-posterior direction, but of considerable height, especially in the frontal region, where it became cone-shaped. After being hardened in spirit, a sagittal section of the head was made, passing through the vertical meridian of the right cornea. The right orbit, which was thereby opened, was found to be extremely shallow, its depth being only 2·5 c.cm. from its inferior border to the optic foramen. The height of the orbit, on the other hand, was increased, measuring 32 mm. at its most anterior part, while 20 mm. is· the normal measurement at this period. The corpus callosum was absent, and in certain localities the surface of the brain presented a microgyrous condition. After re-moval of the brain, a photograph of the skull was taken by Dr. D. J. Cunningham, Professor of Anatomy in the University of Dublin, who, like myself, was much in-terested in the specimen. The floor of the orbit was horizontal, but the roof was almost vertical in position, being directed upwards and forwards at an angle of 45°, and becoming continuous with the vertical plate of the frontal bone, into which it passed with only a small projec-tion to mark the orbital edge. A perpendicular line from the front of the vertical portion of the frontal bone would fall entirely behind the globe. The optic nerve, from its entrance at the optic foramen, ascended sharply and remained in close relation with the displaced roof of the orbit, till it bent downwards to enter the sclerotic. A complete explanation for these extraordinary conditions is not given in Mr. Power's communication, and as I was particularly desirous to have one for a special purpose, I applied to Dr. Kanthack, late Curator to the Museum of St. Bartholomew's Hospital, and he in the kindest manner lent me the specimen for further examination, and I then submitted it for that purpose to Professor Cunningham.

He ascertained that with the single exception of the joint between the ex-occipital and the basi-occipital, every suture and synchondrodial joint in the skull was firmly ossified. The consequence of the solidification of the base, and the ossification of the vault into a continuous bony sheet, was the general uplifting of the front part of the roof of the cranium by the growing brain, and the simultaneous dragging up with it of the orbital plates, to which is due the extreme shallowness of the eye sockets.

It was also found that the convolutions of the brain had pressed so hard against the ossifying cranial vault, that the normal dimples had become deep bony pits, and the floors of these pits had become exceedingly thin and diaphanous. The case affords a valuable instance of the effect of premature synostosis in producing such deformities, and their resulting displacements of the eyeballs.

Mr. G. A. Berry, Vice-President, in the chair.

November 11, 1897.

Heredity and the Development of Myopia.—Mr. Wray read a paper on this subject. He began by stating that some observers found a family history in as many as 60 per cent. of their cases of myopia. On the assumption that one-fourth of the hereditary tendencies are from each parent, and one-sixteenth from each grandparent, it was plain that heredity predisposition would appear more and more in the etiology of myopia. Mr. Wray questioned the expediency of using the term " acquired myopia " lightly, as no case could legitimately be called " acquired " unless ancestral myopia could be disproved, which he contended was impossible. He next submitted that authorities repudiated the possibility of the transmission of acquired structural peculiarities, and experimental evidence was quoted to the effect that the removal of an eye in rabbits during many successive generations failed to cause the birth of one-eyed

offspring. He conceded the transmissibility of ordinary myopia, and then stated that there was no relation between the sum of the myopia of myopic parents and the amount that would appear in the offspring, and when the highest grades had been found the parental myopia was usually confined to one parent. Since Fukala's operation had come into vogue Mr. Wray had given special care to the investigation of the antecedents of such patients, and found in a considerable number of cases that the child with very high myopia had suffered from protracted infantile marasmus, whilst the brothers and sisters who escaped had not. He further stated that out of 126 cases of myopia over 10 D. he had not found one instance in which parent and child were both subject to an equal or approximately equal amount. The existence of the highest grades of myopia in one eye only made it exceedingly probable that other influences acted as powerfully as marasmus in the predisposed. Since such grave disproportions never arose in the limbs during their development, it was necessary to consider the difference in their development, and this was to be found in the way in which the vitreous was formed by the passage of mesoblastic elements into the secondary optic vesicle. Mr. Wray suggested the possibility of hypo-inclusion being the basis of hypermetropia and excessive inclusion the cause of myopia. He thought that this theory would explain the variation in the age at which myopia appears, and the phenomena of stationary and progressive hypermetropia and myopia, as well as numerous other points in the pathology of myopia.

Potassium Permanganate in Ophthalmia. — Mr. Sydney Stephenson communicated particulars of a case of purulent ophthalmia in an infant where the frequent use of a strong solution of potassium permanganate had given rise to a deposition of manganese dioxide upon the cornea. The mark, which was of coal-black colour, disappeared a few days after the use of the solution had been discontinued.

Cataract Extraction.—Surgeon-Captain Herbert, I.M.S., in a paper on cataract extraction, said that the conditions

29

of operating were unfavourable in India, and he had found it impossible to exclude infection till he employed strong perchloride (1 in 2,300) as a routine antiseptic. The lotion was used freely to the face, lids, and conjunctiva, then cocaine was instilled, the lids being kept closed to prevent the drying of the epithelium, and during the operation the surface of the eyeball was kept moist by the constant dropping of boiled saline solution. Since the adoption of this method he had performed 281 extractions; there had been no suppurations and no iritis severe enough to affect vision.

Pseudo-Glioma due to Choroido-Retinitis Secondary to Meningitis.—Mr. L. V. Cargill described a case of this nature in a male infant, with good family history, born at full term, and perfectly healthy until three months old, when he suddenly developed meningitis. A fortnight later the left eye was noticed to be affected with pseudo-glioma. Two months afterwards hydrocephalus was developing and was associated with retraction of the head. Right optic papillitis was discovered, whilst the left membrana tympani was found to be perforated, there having previously been slight purulent discharge from the left ear. The hydrocephalus increased, the left eye underwent shrinking, whilst the right eye remained unaffected except for atrophy of the optic disc. The child died about ten months after the first onset of illness. A *post-mortem* examination was not obtained. Mr. Treacher Collins had observed from pathological examination that these cases were more often retinitis than choroiditis. The course of the affection was, he thought, from the throat by the Eustachian tube, middle ear, meninges, and optic nerve to the eye.

Case of Albuminuric Retinitis.—Mr. Arnold Lawson and Dr. G. A. Sutherland described a case of albuminuric retinitis. A girl, aged 12 years, was brought to the hospital on October 29, suffering from headache and vomiting. Examination showed the presence of albumin in the urine and albuminuric retinitis in both eyes. The

history of her illness consisted of intermittent attacks of headache during the last ten months. These had recently become much worse, and were frequently accompanied by vomiting and great prostration. She had never had scarlet fever, or any cardiac affection. She was always a ravenous eater, and especially fond of meat. The family history was good, except for phthisis on the mother's side. The patient was bright and intelligent, and showed no lethargy. There was a diffused heaving impulse over the precordial region. The apex beat was three-quarters of an inch outside the nipple line in the fifth space. The heart's first sound at the apex was rough and accompanied by a short blowing murmur. The second sound was accentuated at the base. Arterial pulsation was visible in the large vessels of the neck. The pulse was small, regular, and of high tension, and there appeared to be some thickening of the vessel walls. Urine was acid and cloudy and its specific gravity was 1010. Albumin was present in considerable quantities. Microscopically, casts, for the most part hyaline, but also a few epithelial or fatty, were found. The fundus in each eye presented the usual changes due to albuminuric retinitis in a typical and advanced form. The case appeared to be one of primary chronic interstitial nephritis occurring at an unusually early age. The symptoms were precisely similar to those met with in adults suffering from this disease. The cause was obscure. Possibly a long course of over-feeding might have so affected the blood as to induce irritative changes in the kidney. No record of any case of albuminuric retinitis occurring at so early an age could be found. One case at 15 years had been recorded by Mr. Benson in 1883.

Mr. Nettleship mentioned two cases of albuminuric reti- nitis in children. One was in a boy, the details of whose case he could not recall, but who was under observa- tion for a year ; the other was in a little girl, who was said to have recently had Bright's disease. In the latter case there was great pallor of the optic nerve and old retinal changes with much impairment of vision.

Dr. Breuer said that Dr. Bull had published a series of

cases, one of which was in a boy, aged 5 years. In every case in which a *post-mortem* examination had been made interstitial and not glomerular nephritis had been found.

Mr. Lawford had recently seen a boy, aged 17 years, with albuminuric retinitis ; he also had chronic interstitial nephritis ; he improved materially.

Mr. Holmes Spicer had recently been asked to see a child at the Children's Hospital who had all the signs of acute nephritis. On examining the eyes there were a few small retinal hæmorrhages, but no large masses of exudation.

ANOMALIES IN THE FUNCTIONS OF THE EXTRINSIC OCULAR MUSCLES.[1]

By F. BULLER, M.D., MONTREAL.

THE complex phenomena which constitute the act of vision have been so thoroughly elaborated in the science of physiological optics, that the ophthal- mologist justly claims for his work a greater exactness than pertains to any other department of medicine or surgery.

Certain well defined laws enable him to detect and successfully contend with abnormal conditions in refraction and accommodation. An absolute standard of visual perfection, both for form and colour, serves as a guide in every functional examination of vision, and the ophthalmoscope enables him to discover the most minute pathological lesions in the interior of the eye itself. A complete and methodical examination will often enable him to determine, with surprising pre- cision, the nature and gravity of morbid conditions beyond the eye and even in other organs of the body. When, however, he comes to investigate the compli- cated problems presented in the function of binocular vision which, in the presence of a multitude of dis- turbing influences, may be rendered hopelessly difficult, he feels that he is still treading upon uncertain ground. Since the majority of eyes possess a normal refraction,

30

Ophth. Review. Vol. XVI., No. 194, December, 1897.

a definite power of accommodation and acuity of vision which varies but little in different subjects, though in all these particulars a certain physiological variation is recognised, it would be strange if the muscular movements of the eyes did not correspondingly follow approximately definite laws. In all probability they do, and it is not unlikely that estimated rotating power of the different muscles, as determined by innumerable examinations of the normal muscular functions, is fairly correct as regards both monocular and binocular vision. It is also probable that very considerable variations from the alleged physiological standards of motility thus obtained are consistent with easy and accurate vision. Since, however, slight errors in refraction in certain subjects unquestionably give rise to intense visual disturbance, there seems no reason why the same rule should not apply in cases of defective or faulty motility, except that in so complicated a piece of machinery it may fairly be assumed that the physiological limit is still more variable than is the case with any of the other factors which contribute to the act of vision. However this may be, there is no question as to the existence of serious visual and even systematic disturbances due to faults in the extrinsic muscles of the eyes, especially those which render the function of binocular vision difficult and wearisome.

The series of observations which form the basis of this communication relate, indeed, only to this class of cases.

To begin with I have relied chiefly upon the equilibrium tests made at the standard distance of six metres and assumed that the normal for this distance is the status known as orthophoria. Allowing for physiological variation from this, I have attached little or no importance to lateral deviations of two or three prism-degrees, and I am quite certain there are many persons who present much greater deviations than

this (latent squint) without experiencing the least discomfort.

I have also neglected all cases of hyperphoria which could not be shown to exceed one degree. I am not prepared to assert that one degree or less of hyperphoria may not in some persons cause more or less discomfort. If so this should be relieved by wearing a correcting prism, and I am under the impression that I have succeeded in relieving a few of these cases in this way.

The objections charged against prisms of two or more degrees do not hold good in prismatic action so feeble as this, and it may be that the mere mental effect of wearing glasses accounts for the apparent benefit, as there must be a strong neurotic element in all cases that experience distress from very slight perturbing influences, otherwise we should meet with an infinitely larger number of people disturbed by wearing improperly centred glasses than is actually the case. This statement must not be construed in such a way as to minimise the importance of wearing properly centred glasses in all cases. It is merely intended to point out the incontrovertible fact that there are vast numbers of persons who can and actually do overcome slight artificial deviations without difficulty.

It is not an uncommon experience that weak prisms, worn for the correction of faulty equilibrium, afford relief for some time and then lose their effect. I have come to regard this as an indication for operative interference in some cases where the proper course to pursue was difficult to determine.

The equilibrium tests were made in distance (6 metres) with prisms, Stevens' phorometer and the compound Maddox rod coloured red. I regard this instrument as not less reliable than the Stevens' phorometer, but have habitually used both.

It was essential to have some standard of fusion

power, and the following was accepted as normal. Abduction 5° to 8°, adduction 25° to 50°, sursumduction 2° to 3°.

This standard is not absolute, and is chiefly useful for purposes of comparison. In every case where there is binocular vision, the range of fusion may be temporarily increased in any direction by systematic exercise of the muscles. I have seldom known this apparent increase in power to be long maintained after the exercises had been discontinued.

Equal exercise of all the muscles will sometimes develop a preponderating power in a sense that did not exist before. This fact, when it occurs, is more significant than the original latent tendency. An habitual abduction of 5° and adduction of 25° (in the absence of hyperphoria) could hardly be regarded as abnormal, but an abduction of 5° with an adduction of 60° or more, and esophoria of more than 2° or 3° would probably be sufficient justification for operative interference.

When there is binocular vision with a latent tendency in any direction, and a considerable relative excess of power in the muscles acting in that direction, the fault may safely be corrected by operation—tendon relaxation or tendon shortening. Relief from headaches, asthenopia, and neurasthenic symptoms often follows such operations ; they are, therefore, not only justifiable, but positively indicated under such circumstances in the absence of refractive error, or where the refraction has been corrected without affording relief. A careful investigation of every case of muscular anomaly during a number of years in private practice has furnished from a material of 8,000 patients 110 cases that seemed suitable for operative interference, i.e., about 1·4 per cent.; they may be classified as follows :—

Esophoria	...	...	...	37
Exophoria	...	...	...	31
Hyperphoria	...	...	...	30
Hyper-exophoria		...	...	10
Hyper-esophoria		...	...	2

110

A tabulated statement showing the principal features of each case may be of some interest. The figures showing the degrees of tendency and fusion power are the average of several, sometimes of many measurements in each case.

It will be seen that the number of cases operated upon for the three principal forms of deviation are nearly equal, *i.e.*, 37 cases of esophoria, 31 of exophoria and 30 of hyperphoria. There were only 12 cases requiring operation for the correction of both horizontal and vertical deviation, and only 2 of these were for an upward and inward deviation.

I desire to call attention to this fact, as it is a striking commentary on the contention of those who claim that the chief factor in the ætiology of convergent squint is to be found in the presence of hyperphoria.

A study of the tabulated results shows that there were 39, or 35·4 per cent. of cases which may fairly be classed as cured ; 37, or 33·6 per cent., greatly benefited ; 20, or 18 per cent., somewhat benefited ; 8 unimproved, and in 6 the result was unknown. Leaving out these last 14 cases the operations would appear to have benefited in 87 per cent. of all the cases so treated. This is perhaps as good a result as attends most surgical operations, and in this connection I may add that I am not aware of any instance in which the result was actually injurious to the patient. I am therefore justified in claiming that the usual operations performed for the relief of persons

TABULATED RESULTS.

Case.	Name.	Sex.	Age.	Refraction.	Vision.	Deviation.	Degrees.	Abduction.	Adduction.	Symptoms.	Operation.	Result.
1	M. L. …	F.	31	R. + 1 D. … … L. + 1 D. … …		Exophoria	9	17°	30°	Asthenopia. Headaches. Frequent conjunctivitis	Tenot. L. ext. rectus	Not known.
2	A. S. …	F.	37	R. 70° — 0.50 — 4.50 L. 100° — 0.75 — 4.50		Exophoria	6	14°	22°	Frequent neuralgic headaches. Blepharitis	Tenot. L. ext. rectus	Complete relief.
3	M. F. …	F.	36	R. 50° + 0.50 + 0.50 L. 130° + 2.50 + 1.00		Hyper-phoria	R. 3	6°	18°	Intense asthenopia. Severe headaches	Tenot. L. inf. rectus	Considerable relief.
4	Mrs. E.…	F.	36	R. — 0.50 … … L. 90° — 1.25 — 0.75…		Esophoria	15	3°	75°	Headache and asthenopia	Tenot. L. int. rectus	Great relief.
5	Mrs. L.…	F.	60	R. Emmetropia … … L. Emmetropia … …		Hyper-phoria	R. 2	5°	27°	Frequent sick headaches and asthenopia	Tenot. L. inf. rectus	Eight years later: relief from asthenopia ever since, but not from headaches.
6	T. S. …	F.	34	R. Emmetropia … … L. Emmetropia … …		Exophoria	10	13°	22°	Asthenopia. Chronic conjunctivitis. Epiphora	Tenot. both ext. recti at intervals of 6 months	Much relief from the asthenopia.
7	J. A. · …	M.	43	R. Emmetropia … … L. Emmetropia … …		Exophoria	7	11°	10°	Asthenopia. Chronic blepharitis and conjunctivitis	Tenot. L. ext. rectus	Asthenopia relieved though not entirely cured. Exophoria 3° remained.
8	A. McA.	M.	23	R. H. 1 D. … … L. H. 1 D. … …		Exophoria	7	10°	10°	Asthenopia and chronic conjunctivitis	Tenot. both ext. recti	Complete relief.
9	A. J. …	M.	19	R. M. 13 D. … … L. M. 13 D. … …		Hyper-exophoria	6	18°	17°	Asthenopia. Spasm of all and of orbicularis	Tenot. both ext. recti and of R. sup. rectus	Complete relief.

No.	Name	Sex	Age	Refraction	Vision	Phoria		°	°	Asthenopia and headaches	Operation	Result
10	J. C. A...	M.	29	R. 90° + 0·25 + 0·75 ... L. + 0·75 ...	6/6 6/6	Hyperphoria	2	6°	20°	Asthenopia and headaches	Tenot. R. inf. rectus	Not improved, though orthophoria was attained.
11	J. McA...	M.	28	R. + 0·75 ... L. + 0·75 ...	6/6 6/6 6/6 6/15	Hyperphoria Exophoria	2	6°	24°	Asthenopia of many years' standing	Tenot. L. inf. rectus	Partial relief.
12	C. S. ...	F.	28	R. 165° − 3·50 − 1·00 L. 15° − 3·00 − 1·00	6/6 6/15	Exophoria	8	15°	15°	Frequent and severe headaches, not relieved by glasses. Asthenopia	Tenot. L. ext. rectus	Improved. Final results not known; incomplete effect.
13	J. H. B...	M.	36	R. + 1·25 ... L. + 1·25 ...	6/4 6/4 6/6	Hyperphoria	1½	7°	35°	Asthenopia for many years; pain in the eyes at night	Tenot. R. inf. rectus	Complete relief.
14	R. E. T...	M.	17	R. 10° − 0·50 − 9 ... L. 180° − 1·75 − 9 ...	6/6 6/6 6/9 6/9	Hyper-exophoria	2½ ex. 7	13°	30°	Headaches and asthenopia	Tenot. R. inf. rectus	Some relief.
15	C. C. A...	F.	56	R. 175° − 1·25 − 1·00 L. 10° − 2·50	6/9 6/9 6/9 6/9	Hyperphoria	2	8°	26°	Asthenopia and frequent headaches	Tenot. R. inf. rectus	Freed from asthenopia and nearly so from headaches.
16	S. H. ...	F.	11	R. 180° −0·50 −7·00 L. 30° − 1·50 −7·00	6/30 6/18	Hyper-exophoria	4 ex. 15	18°	22°	Asthenopia; cannot use the eyes in school work	Tenot. R. inf. rectus, L. sup. rectus, L. ext. rectus	Reported improvement. Result not known definitely.
17	S. W. ...	M.	24	R. Emmetropia L. Emmetropia	6/6 6/6	Esophoria	13	8°	65°	Constant discomfort in near work. Frequent attacks catarrhal conjunctivitis	Tenot. L. int. rectus, and later R. inf. rectus	Relief almost complete.
18	A. F. ...	F.	36	R. Emmetropia L. Emmetropia	6/9 6/9	Esophoria	9	5°	50°	Frequent headaches. Blepharitis, conjunctivitis	Advanced both ext. recti. Tenot. R. int. rectus	Condition greatly improved. Headaches relieved.
19	E. C. S...	M.	37	R. Emmetropia L. Emmetropia	6/9 6/9	Esophoria	30	0°	60°	Diplopia many years. Asthenopia. Intense neurasthenia	Advanced both ext. recti. Tenot. both int. recti	Gradually recovered comfortable vision & resumed his work, which he had been obliged to give up.
20	Mrs. R....	F.	29	R. 90° + 0·25 + 1·00 L. 4° + 1·75 ...	6/6 6/6	Esophoria	5	3°	45°	Frequent headaches. Blepharitis conjunctivitis	Advanced L. ext. rectus, later R. ext. rectus	Greatly improved.
21	E. B. ...	F.	25	R. Emmetropia L. Emmetropia	6/6 6/6	Exophoria	7	13°	28°	Asthenopia and intense headaches for many years	Tenot. L. ext. rectus, later R. ext. rectus	Not relieved. Exophoria only reduced to 5°.

TABULATED RESULTS—continued.

Case	Name	Sex	Age	Refraction	Vision	Deviation	Degrees	Abduction	Adduction	Symptoms	Operation	Result
22	Miss B...	F.	20	R. — 10 D. L. — 9 D.		Hyper-exophoria	3 ex. 13	18°	34°	Frequent and intense headaches; new work always brings them on	Tenot. R. inf., L. ext. and L. sup. recti	Greatly relieved.
23	M. W. ...	F.	17	R. — 4·50 L. + 5·00		Hyperphoria	3	16°	40°	In reading the print is unsteady, and this always causes headaches	Tenot. L. inf. and R. int. recti	Could use the eyes with perfect comfort a year later.
24	L. H. ...	F.	34	R. + 1·25 L. + 1·25		Hyper-exophoria	2½ ex. 6	12°	17°	Asthenopia ...	Tenot. R. sup. and L. ext. recti	Much relieved.
25	I. C. ...	F.	19	R. — 2·25 L. — 2·25		Exophoria	6	18°	16°	Asthenopia and headaches	Tenot. both ext. recti	Complete relief.
26	A. S. ...	M.	30	R. Emmetropia L. 55° + 1 D. ...		Exophoria	7	13°	15°	Blepharitis. Asthenopia.	Tenot. both ext. recti	Much relieved.
27	W. L. W.	M.	35	R. 65° + 0·75 + 7·25... L. + 1·75 ...		Hyper-phoria	12	6°	14°	Asthenopia ..	Tenot. R. int. rectus, later L. inf. rectus	Greatly relieved.
28	M. McG.	M.	18	R. + 1·50 L. — 1·50		Esophoria	6	5°	65°	Asthenopia and chronic conjunctivitis	Tenot. both int. recti	Complete relief.
29	A. H. ...	M.	20	R. 50° — 1·75 — 0·75 L. 90° — 1·50 — 1·00...		Esophoria	8	6°	65°	Asthenopia conjunctivitis. Hyperæmia not relieved by glasses	Tenot. int. recti at interval of 2 weeks	Complete relief.
30	Mrs. F....	F.	42	R. + 1·00 L. + 1·00		Exophoria	10	12°	17°	Persistent headaches for many years	Tenot. both ext. recti at interval of 5 days	Eight months later reported much better.

		M.		R./L.									
31	H. L. ...	M.	16	R. + 1·25 L. + 1·25	... ...	⁶⧸₆ ⁶⧸₆	Esophoria	11	5°	63°	Headaches induced by any new work and not relieved by glasses	Tenot. both int. recti at intervals	Reported that the eyes could be used without discomfort.
32	T. O. ...	M.	12	R. + 1·50 L. + 1·50	... ...	⁶⧸₆ ⁶⧸₆	Hyper-phoria	6	2°	3°	Headaches almost continually. Nervous attacks supposed to be of an epileptic character. Sleeps very badly.	Tenot. L. sup. rectus	A month later reported much better. Case not complete.
33	Mrs. A...	F.	62	R. + 3·50 L. + 3·50	... ...	⁶⧸₆ ⁶⧸₆	Hyper-phoria	2½	5°	17°	Inveterate asthenopia. Frequent headaches	Tenot. L. inf. and R. sup. rectus	Followed by gradual and, ultimately, great relief.
34	F. McC...	M.	34	R. + 0·50 L. + 0·50	... ...	⁶⧸₆ ⁶⧸₆	Exophoria	3 in all 10	9°	20°	Asthenopia. Frequent attacks conjunctivitis	Advancement L. int. rectus	Reports some relief from asthenopia.
35	G. S. ...	F.	16	R. 180° — 1·00 — 8·00 L. 180° — 1·00 — 8·00	... ...	⁶⧸₆ ⁶⧸₆	Hyper-phoria	2	14°	10°	Headaches and asthenopia. Pain in back of the eyes	Tenot. R. sup. rectus	Reported perfect relief.
36	P. B. ...	F.	9	R. 90° — 0·50 — 1·00 L. 55° — 0·50 — 1·00	... ...	⁶⧸₆ ⁶⧸₆	Exophoria	10	14°	10°	Asthenopia	Tenot. L. ext. rectus in 1888, of R. ext. rectus in 1889	Relief of the asthenopic symptoms.
37	A. F. ...	F.	25	R. Emmetropia L. 180° — 0·50	... ...	⁶⧸₆ ⁶⧸₆ ⁶⧸₆ ⁶⧸₆	Esophoria	15	4°	65°	Headaches and asthenopia	Tenot. R. int. rectus	Complete relief.
38	A. P. ...	F.	25	R. + 0·75 L. + 0·75	... ...		Esophoria	5	14°	20°	Asthenopia	Tenot. R. ext. rectus	Some relief.
39	W. McF...	M.	17	R. Emmetropia L. Emmetropia	... ...		Esophoria	12	3½°	41°	Asthenopia	Advancement both ext. recti	Asthenopia relieved.
40	W. C. B.	M.	22	R. ... L. ...	... ...	...	Esophoria	8	2°	62°	Asthenopia. Burning sensation in eyes when used	Tenot. R. int. rectus	Partial relief. Case never completed.
41	Mrs. S...	F.	39	R. 90° + 0·50 ... L. 90° + 0·50 ...	... ...	⁶⧸₆ ⁶⧸₆ ⁶⧸₆	Exophoria	6	13°	10°	Neuralgia many years	Tenot. L. ext. rectus	Complete relief for 8 years.
42	Miss M...	F.	52	R. + 1·00 ... L. + 1·00 ...	... ...		Hyper-phoria	3	5°	22°	Asthenopia. Chronic conjunctivitis	Tenot. L. sup. rectus	Relief from the asthenopia and conjunctivitis.

Tabulated Results—*Continued*.

Case.	Name.	Sex.	Age.	Refraction.	Vision.	Deviation.	Degrees.	Abduction.	Adduction.	Symptoms.	Operation.	Result.
43	J. S. M...	F.	32	R. + 0·50 / L. + 0·50	6/6 6/6	Exophoria	7	13°	11°	Frequent neuralgic headaches	Tenot. both ext. recti at intervals of 1 month	Headache less frequent and less severe.
44	R. G. ...	M.	21	R. + 0·75 / L. + 0·75	6/6 6/6	Esophoria	7	1½°	60°	Asthenopia. Chronic conjunctivitis	Tenot. both int. recti at interval of 3 months	Complete relief.
45	G. S. D...	M.	37	R. 90° + 2·25 − 1·00 / L. 100° + 2·00 − 1·00	6/6 6/6	Hyperphoria	2	5	18°	Frequent headaches	Tenot. R. int. rectus	Said to have been relieved almost completely.
46	T. B. B...	F.	35	R. 140° + 1·00 − 4·50 / L. 25° − 0·50 − 2·00	6/12 6/6	Esophoria	15	1°	50°	Headache. Frequent diplopia and confusion of vision	Tenot. L. int. rectus	Complete relief.
47	M. E. ...	F.	46	R. 180° − 3·50 + 1·50 / L. 180° − 0·75 + 1·00	6/12 6/6 6/6	Hyperesophoria	5, es. 8	5°	13°	Headaches ...	Tenot. L. int. rectus	Not known. Case incomplete.
48	W. W. G.	M.	24	R. 80° − 1·00... / L. 160° − 0·50		Esophoria	20	10°	70°	Headaches ...	Tenot. L. int. rectus	Said to have found some relief. Final result not known.
49	J. H. S...	M.	25	R. + 1·50 / L. + 1·50	6/6 6/6	Esophoria	6	3°	63°	Asthenopia ...	Tenot. both int. recti at intervals of 2 days	Three and a-half years later : could use the eyes with perfect comfort ever since the operation.
50	J. D. ...	F.	24	R. + 1 D. / L. + 1 D.	6/6 6/6	Esophoria	8	5°	53°	Asthenopia ...	Tenot. L. int. rectus	Three months later reports much improved.

No.	Name	Sex	Age	Refraction		Type	12	1°	8°	Diplopia. Asthenopia. Neurasthenia	Advanced and shortened L. inf. rectus	Result
51	Mrs. T....	F.	36	R. + 1.50 / L. + 1.50	…	Hyperphoria	3½	5°	24°	Diplopia. Asthenopia. Neurasthenia	Advanced and shortened L. inf. rectus	Almost complete relief in the course of a few weeks.
52	D. P. ...	F.	12	R. 180° – 1.00 – 5.50 / L. 180° – 1.00 – 5.50	…	Hyperphoria Exophoria	10	16°	14°	Headaches and asthenopia	Tenot. L. sup. rectus	No benefit.
53	Mrs. S. S.	F.	35	R. 90° – 0.75 – 6.00 / L. 90° – 0.50 – 7.00	…	Exophoria				Asthenopia. Headaches, Hyperemia. Conjunctivitis	Tenot. R. ext. rectus	Improved.
54	D. K. ...	M.	45	R. Emmetropia / L. Emmetropia	…	Esophoria	7	3°	65°	Asthenopia. Hyperemia. Conjunctivitis	Tenot. L. int. rectus	Much relieved.
55	H. B. L.	M.	19	R. 90° – 0.75 – 1.25 / L. 50° – 0.50 – 1.25	…	Hyperexophoria	6 ex. 4	14°	30°	Frequent and severe headaches and asthenopia	Tenot. L. sup. and L. ext. recti	Complete relief.
56	C. K. A...	F.	50	R. + 2.00 / L. + 2.00	…	Hyperphoria Esophoria	6	5°	27°	Inveterate asthenopia many years	Tenot. R. int. and L. int. recti	Great relief.
57	A. G. ...	F.	19	R. 140° – 0.50 – 5.50 / L. 35° – 0.50 – 2.75	…	Esophoria	25	0°	65°	Asthenopia. Headaches	Tenot. both int. recti at intervals	Complete relief.
58	J. W. ...	M.	24	R. 180° – 1.00 + 0.50 / L. 180° – 1.00	…	Esophoria	6	3°	54°	Asthenopia …	Tenot. L. int. rectus	Much relieved.
59	C. M. ...	M.	21	R. 15° – 1.50 – 9.00 / L. 175° – 1.50 – 9.00	…	Hyperexophoria	7 ex. 20	20°	11°	Headaches very severe and frequent	Tendon shortening both int. recti. Tenot. L. sup. rectus	A satisfactory equilibrium established. Final result not known.
60	A. E. ...	F.	16	R. Emmetropia / L. Emmetropia	…	Hyperphoria Exophoria	3½	6°	18°	Headaches. Neurasthenia. Insomnia	Tenot. R. sup. recti	Complete relief.
61	H. R. ...	F.	26		…	Esophoria			60°	Epilepsy. Headaches. Asthenopia	Both ext. recti twice	Apparently some benefit.
62	C. C. ...	F.	17	R. 180° – 1.00 – 6.00 / L. 180° – 1.00 – 6.00	…	Esophoria	20	2°	60°	Frequent headaches. Asthenopia	Tenot. both int. recti	Complete relief.
63	Miss D...	F.	24	R. 15° – 3.00 – 11.00 / L. 160° – 3.00 – 10.00	…	Hyperphoria Esophoria	5	9°	26°	Asthenopia …	Tenot. L. inf. rectus	Great relief.
64	S. S. ...	M.	26	R. + 1.25 / L. + 1.12	…	Esophoria	12	3½°	50°	Frequent headaches and asthenopia	Tenot. both int. recti	Complete relief.
65	G. W. G.	M.	41	R. 180° – 2.75 / L. 180° – 4.00 – 2.00	…	Hypertrophia	25	?	?	Diplopia and confusion of vision	Advancement L. inf. and tenot. L. sup. rectus	Perfect relief, and binocular vision established.

TABULATED RESULTS—*Continued.*

Case.	Name.	Sex.	Age.	Refraction.	Vision.	Deviation.	Degrees.	Abduction.	Adduction.	Symptoms.	Operation.	Result.
66	Miss P...	F.	24	R. + 1·25 ... L. + 1·25 ...		Esophoria	20	1°	62°	Asthenopia ...	Tenot. R. int. rectus	Six months later esophoria 8°. Can use the eyes with comfort since the operation.
67	M. M. ...	F.	23	R. 90° — 1·25 ... L. 80° — 1·25 ...		Esophoria	4	1½°	50°	Asthenopia and headaches	Advanced L. ext. rectus	Not relieved, though 7 months later there was orthophoria.
68	M. C. ...	F.	43	R. + 4·00 ... L. + 3·50 ...		Hyperphoria	10	?	?	Diplopia. Frequent headaches. Had an operation for converg. strabismus as a child. Diplopia ever since	Tenot. R. sup. rectus Tenot. L. inf. rectus	Vert. deviation cured, but not the diplopia.
69	P. D. J...	M.	43	R. Emmetropia L. Emmetropia		Exophoria	15	18°	23°	Headaches. Neurasthenia	Tenot. both ext. recti at 4 days' interval	Great relief.
70	F. X. L...	M.	30	R. 180° — 1·00 + 0·50 L. 180° — 1·00 + 0·50		Exophoria	9	12°	28°	Neurasthenia and intense asthenopia	Tenot. L. ext. rectus	Much relieved. Case not complete.
71	D. A. ..	M.	26	R. + 0·50 ... L. + 0·50 ...		Exophoria	12	19°	41°	Epilepsy. Asthenopia	Tenot. both ext. recti at interval of 4 days	No material improvement, though normal muscular relations were established.
72	J. H. L...	F.	24	R. + 1·00 ... L. + 1·00 ...		Exophoria	7	12°	25°	Asthenopia ...	Tenot. R. ext. rectus	Some relief.

No.	Name	Sex	Age	Refraction	Vision		Angle			Symptoms	Operation	Result
73	Mrs. S....	F.	48	R. —3·00 L. —3·00	... ...	Exophoria	8	11°	35°	Headache always brought on by use of the eyes. Has binocular vision	Tenot. L. ext. rectus	Some relief.
74	M. E. ...	F.	27	R. —3·50 L. —5·00	6/15, 4/9, 6/15, 6/27	Exophoria	23	22°	20°	Headaches frequent and intense	Tenot. both ext. rectus	Complete relief.
75	F. C. ...	F.	26	R. 155° —3·00 + 6·00 L. 45° —3·50 + 6·00		Hyperphoria	8	2°	10°	Headaches ...	Tenot. R. sup. rectus, later L. inf. rectus	Headaches almost entirely relieved.
76	Mrs. K...	F.	26	R. —7·00 L. —7·00	6/6, 6, 6	Esophoria	16	7°	73°	Headaches ...	Tenot. L. int. rectus, later tenot. R. int. rectus	One month later, headaches were not relieved, though muscular relations were normal.
77	G. S. T...	F.	20	R. + 0·75 L. + 0·75		Exophoria	8	15°	17°	Headaches. Chronic blepharitis	Tenot. R. ext. rectus	Greatly relieved.
78	L. G. ...	M.	17	R. + 0·50 L. + 0·50		Hyperphoria	7	6°	19°	Headaches and asthenopia	Tenot. R. sup. rectus	Hyperphoria reduced to 2°, with prism correction of this is perfectly comfortable.
79	L. S. ...	F.	32	R. Emmetropia L. 90° —0·25 + 4·00...		Exophoria	10	15°	?	Asthenopia and blepharitis	Tenot. L. ext. rectus	Completely relieved.
80	Miss V....	F.	35	R. 135° —0·25 — 5·50 L. 180° —0·50 — 5·50		Exophoria	12	17°	25°	Asthenopia and frequent attacks of conjunctivitis	Tenot. both ext. recti at interval of 3 days	One year later reports complete relief.
81	H. Y. B.	M.	15	R. Emmetropia L. Emmetropia	6/6, 6, 6	Hyperexophoria	7 ex. 10	variable	variable	Headaches and asthenopia	Tenot. L. inf. recti. Advancemen L. int. rectus	Complete relief.
82	Miss R....	F.	20	R. 180° —3·50 + 0·50 L. 180° —3·50 — 0·25	6/6, 6/15	Hyperphoria	3½	9°	30°	Frequent neuralgia and occasional sick headache	Tenot. R. sup. and L. inf. rectus	Considerable relief 6 months later.
83	F. C. ...	F.	25	R. 180° —1·0 — 6·00 L. 90° —0·50 — 5·00	6/12, 6, 7·5	Hyperexophoria	10 ex. 20	?	?	Headache and asthenopia	Tenot. L. sup. rectus; tenot. L. ext. rectus	Some relief at the time. Final result not known.
84	T. H. B.	F.	25	R. 180° —3·00 L. 180° —3·00 + 1·50	6/5, 6/9	Esophoria	5	3°	53°	Headache ...	Tenot. L. int. rectus	Some relief. Final result not known.

Tabulated Results—Continued.

Case.	Name.	Sex.	Age.	Refraction.	Vision.	Deviation.	Degrees.	Abduction.	Adduction.	Symptoms.	Operation.	Result.
85	E. C. ...	F.	32	R. — 12·00 ... L. — 11·00 ...	6/18, 6/12	Hyperphoria	15	?	?	Neurasthenia. Intense asthenopia. Blepharitis spasm	Tenot. L. sup. rectus; tenot. R. inf. rectus	Great relief.
86	Miss M...	F.	42	R. 165°— 3·50 ... L. 25°— 1·25 — 2·75	6/9 6/9	Hyperexophoria	5 ex. 14	16°	25°	Neurasthenia. Intense asthenopia	Tenot. L. ext. rectus; tenot. R. sup. rectus	Greatly relieved.
87	F. McK.	M.	18	R. Emmetropia ... L. Emmetropia ...	6/7·5, 6/7·5	Esophoria	12	2°	50°	Asthenopia ...	Tenot. both int. recti at intervals	Greatly relieved.
88	Miss J. M.	F.	33	R. — 13·00 ... L. — 13·00 ...	6/12, 6/12	Esophoria	25	7°	63°	Asthenopia ...	Tenot. both int. recti at interval of 1 month	Complete relief.
89	L. C. O...	M.	29	R. 170°— 4·00 + 5·50 ... L. 20°— 4·50	6/12, 6/6	Esophoria	17	5°	45°	Asthenopia ...	Tenot. L. int. rectus	Final result not known.
90	W. M. ...	M.	10	R. + 0·50 ... L. + 0·50 ...	6/6 6/6	Esophoria	20	3° 3°	61°	Asthenopia. Hyperæmia of conjunctiva	Tenot. both int. recti at interval of 2 days	Complete relief.
91	E. H. ...	F.	29	R. + 0·50 ... L. + 0·75 ...	6/6 6/6	Exophoria	12	12°	16°	Asthenopia ...	Tenot. both int. recti at interval of 3 months	Great relief.
92	K. McF.	F.	32	R. Emmetropia ... L. Emmetropia ...	6/6 6/6	Hyperphoria Esophoria	3	6°	15°	Hystero-epilepsy	Tenot. L. sup. rectus	No improvement.
93	C. C. McC.	M.	28	R. 40° + 1·25 + 0·50 ... L. + 0·50 ...	6/6 6/6	Esophoria	7	4°	63°	Headaches ...	Tenot. L. int. rectus	Not known.
94	L. E. ...	F.	17	R. 90° + 0·25 + 0·50 ... L. 90° + 0·25 ...	6/6 6/6	Esophoria	6	1°	50°	Asthenopia ...	Tenot. both int. recti	Great relief.
95	S. C. ...	F.	28	R. 90° — 1·00 — 12·00 ... L. 90° — 1·00 ...	6/15, 6/7·5	Hyperphoria	12	?	?	Headaches and asthenopia	Tenot. R. inf. rectus	Considerably relieved, though there is still 6° of hyperphoria.

No.	Name	Sex	Age	Refraction (R. / L.)	V.	Phoria				Symptoms	Operation	Result
97	J. C. …	M.	30	R. Emmetropia / L. Emmetropia	6/9, 6/9	Hyperphoria	5	3°	17°	Headaches and asthenopia	Tenot. L. inf. rectus	Only partial correction; some relief. Case not complete.
98	W. C. T.	M.	18	R. 20° — 3·50 + 3·00… / L. 165° — 3·50 + 1·25	6/15, 6/15	Hyperphoria	3	1°	14°	Headache and asthenopia	Tenot. L. sup. rectus	Much relieved.
99	M. D. …	F.	14	R. 180° — 0·62 — 1·25 / L. 180° — 0·62 — 1·25	6/9, 6/9	Exophoria	15	17°	15°	Headaches and asthenopia	Tenot. both ext. recti at intervals	Greatly relieved.
100	L. M. …	F.	31	R. — 5·50 / L. — 5·00	6/9, 6/9	Exophoria	8	11°	8°	Asthenopia …	Advanced both int. recti	Complete relief.
101	L. D. …	F.	28	R. + 0·50 / L. + 0·50	6/9, 6/9	Exophoria	15	15°	20°	Asthenopia …	Tenot. both ext. recti	Much relieved.
102	J. B. …	M.	21	R. Emmetropia / L. Emmetropia	6/9, 6/6	Exophoria	11	16°	24°	Asthenopia …	Tenot. both ext. recti	Greatly relieved.
103	F. W. …	M.	23	R. + 1·00 / L. + 1·00	7·5/6, 7·5/6	Esophoria	10	3°	68°	Asthenopia …	Tenot. both int. recti	Complete relief.
	G. T. …	M.	23	R. Emmetropia / L. Emmetropia	6/9, 6/9	Hyperesophoria	7 es. 25	?	?	Diplopia. Asthenopia and difficulty in fixing the eyes	Tenot. R. sup. rectus; both int. recti	Experienced great relief from the diplopia and distress in using the eyes, but muscular conditions were still imperfect.
104	A. H. …	F.	34	R. 180° — 0·75 — 0·25 / L. 180° — 0·50 — 0·75	7·5/6, 7·5/6	Esophoria	13	4°	65°	Intense asthenopia …	Tenot. L. int. rectus twice, R. once	Complete relief.
105	Miss C. …	F.	30	R. Emmetropia / L. Emmetropia	6/12, 6/12	Hyperphoria	12	?	?	Intense and frequent headaches	Advanced R. Tenot. L. inf. recti	Considerably relieved, but hyperphoria 3° still present.
106	L. B. …	M.	22	R. 180° — 0·50 — 5·50 / L. 180° — 0·50 — 5·50	6/7·5, 6/7·5	Hyperexophoria	6 ex. 25	1°	11°	Asthenopia …	Advanced L. inf. rectus; tenot. R. ext. rectus	Case not completed.
107	Miss C. …	F.	28	R. 90° — 0·50 — 2·00 / L. — 2·00	6/9, 6/9	Hyperphoria	4	10°	50°	Headaches and asthenopia	Tenot. R. inf. rectus	Some relief.
108	C. H. T. …	M.	40	R. Emmetropia / L. Emmetropia	6/7·5, 7·5/6	Esophoria	6	3°	55°	Asthenopia and continued vertigo and headaches	Tenot. L. int. rectus	Complete relief.
109	J. R. …	F.	53	R. 90° — 0·75 — 2·00… / L. 55° — 0·75 — 2·00…	6/12, 6/12	Exophoria	15	15°	0°	Diplopia. Neurasthenia	Tenot. both ext. recti	Much relieved.
110	Mrs. L. …	F.	43	R. Emmetropia / L. Emmetropia	6/9, 6/9	Esophoria	16	4°	11°	Vertigo and asthenopia	Tenot. both int. recti	Greatly relieved.

suffering from the various annoyances due to faulty muscular equilibrium, in carefully selected cases are not only harmless, but in a very large percentage of such cases they are followed by satisfactory results in as large a percentage as are obtained, according to most statistics, in the operations for removal of cataract.

It will be observed that whilst there were many cases of refractive error among the 110 cases, there were also a great many with little or no refractive error, and in no case was an operation performed in the presence of a refractive error in which relief was not first sought by its correction. I cannot agree with those who contend that the correction of errors of refraction will always correct associated muscular faults. If this be true, how can we account for the many cases of muscular faults in which refraction is emmetropic ?

It is undoubtedly true that some of the lower grades of muscular faults may be benefited by wearing suitable prismatic glasses, but the usefulness of these is exceedingly limited, and those who depend upon them are doomed to frequent disappointment.

I have not had sufficient experience in the correction of muscular faults in persons suffering from epilepsy and chorea to say that they cannot derive benefit from ocular therapeutics or operations to secure equilibrium, but so far as my experience goes I am inclined to believe that little or no relief is to be expected from such treatment, at least *quoad* the functional nervous disorder, but I would not hesitate to recommend the scrupulous correction of refractive errors in such persons, or of any considerable muscular fault, if present, just as I would recommend the removal of every discoverable source of nerve irritation or cause of ill-health whatever it might be.

A searching analysis of the 110 cases I have tabulated

would bring out a good many interesting facts which I cannot discuss now ; for instance, among those cured there were two of esophoria with normal refraction in which the chief complaint was persistent vertigo, both entirely relieved by tenotomy of the internal recti ; in neither of these, however, was there anything approaching epileptiform phenomena.

The clinical investigation of functional muscular anomalies can only be undertaken at the expense of enormous loss of time and the exercise of unbounded patience on the part of the surgeon ; hard conditions, it is true, but not too hard for him who delights in his profession and feels the joy of overcoming difficulties that have baffled others.

If the results I have now placed on record are reliable, and I believe they are, being the outcome of many years' patient observation and steady work, free, I hope, from partiality of any sort, then it follows that whoever ignores the injurious effects of muscular faults in ophthalmic practice, fails to accord at least 1 per cent. of his patients the benefit which a proper application of his knowledge should bestow.

I have purposely abstained from any discussion of the theoretical aspects of faulty muscular equilibrium, for the reason that I could not on the present occasion do justice to this part of the subject, and from a clinical standpoint it matters not what the cause of physical distress may be so long as the means employed for its relief are efficient.

In reply to some points raised in the discussion which followed the paper, Mr. Buller said : Mr. President, first as to the point raised by Dr. Stevens—want of uniformity in standard of measurement. I claim that it is impossible to establish a definite standard for all cases, and say that a man must come up to that standard or he is abnormal. I think that Dr. Stevens supports me in this contention,

if I remember rightly, in his work on functional muscular disturbances, the first work in which he brought this subject prominently before the public. He admits, I think, in that work, that there is a difference in individuals, and that a man may be allowed a certain difference of muscular power in different ocular muscles, and that what may be normal for one man is not normal for another. In other words, that the relative strength of the ocular muscles has to be taken into account in considering what is the normal standard.

I said, from five to eight degrees for abducting power and twenty-five to fifty for adducting power. Now the relative proportion between these is pretty much the same, and if a man is comfortable with five degrees of abducting power and twenty-five degrees of adducting power after a good many trials as to the strength of the muscles, surely that is sufficient evidence that, as far as he is concerned, we may regard this as a normal condition or a fairly normal condition.

On the other hand, there are a large number of people who I am perfectly convinced cannot get an abducting power of eight degrees excepting by long-continued exercise of the external muscles, and I believe that the abducting power, if increased by exercise, will lapse back into the original condition unless the exercise is maintained, so that it is exceedingly difficult to establish an absolute standard, if indeed it is possible.

As for the method of testing for deviations or the relative merits of the Maddox rod or Stevens' tropometer, I must say I have not found the tendency to confusion with the Maddox rod that Dr. Stevens claims to exist. I have, however, found a somewhat greater degree of deviation by the use of the Maddox rod than by Stevens' tropometer.

Now as to Dr. Mittendorf's remarks concerning the frequency of operating. I would have no objection to doing frequent operations, and getting very little effect at a time, and repeating the operations as often as seemed necessary to achieve my results little by little ; indeed I would prefer to do it in that way if I had such control over

my patients as would enable me to do it, but I am quite sure that if I were to propose to operate upon my patients half a dozen times for correction of slight degrees they would leave me. I have gone on the principle of correcting as nearly as possible in one or two operations any moderate degree of defect, or if there is a large degree of defect I have stated plainly to the patient that I might have to perform several operations. Sometimes I have operated upon one muscle more than once, but never more than twice. That is my position. With regard to the refractive question I thought I had expressed myself distinctly on that point. I do attempt to correct every error of refraction, and correct it as absolutely and completely as I know how. I cannot do more than that. I am only restrained from absolute correction of a refractive error by the ignorance of my patients, most of whom are too ignorant to tell me the difference between a quarter and an eighth of a dioptre !

With reference to Dr. Osborne's question as to what is the proportion of cases in which I have used atropine, I would say I have used atropine or homatropine in all my cases, as I consider that it is essential to use one of these drugs. Homatropine is sufficient in some cases, but in others I think that atropine is necessary, and I use it in order to get absolute correction of the refraction, for I know that in people less than 50 years of age you cannot depend upon getting absolute correction without using a mydriatic. I investigate the refractive error most scrupulously before doing anything for the muscular faults. I think Dr. Howe has misunderstood me in my statement as to the large number of cases of normal eyes in which hyperphoria was discovered. I quite agree with him that an absolutely normal eye, a physiologically normal eye, is a rarity, and I thought I had explained that part of my position sufficiently clearly in saying that I allowed for physiological deviations to a slight degree, and where there was no disturbance apparently resulting from abnormal conditions I certainly would not be in favour of interfering in any way.

The tests as to muscular strength were made of course by examinations repeated sufficiently often to justify me in my own mind, in assuming that I had arrived at about what was the limit of the muscular power in the individual before I proceeded to operate.

I have not operated upon any of these cases where it was fair to assume that the headaches were due to a fault in the general health. Surely if a person comes to you with a history of having headaches for fifteen or twenty years, it is absurd to assume that it is due to some fault in the general health which can be cured by giving him some trumpery drug or other. As a general rule, long-continued trouble of this kind depends upon something pertaining to the individual, which cannot be so easily corrected. If in the course of ten or fifteen years an individual has not had opportunity of improving his health in such a way that he can correct headaches depending on it, it is certainly remarkable, but if he comes to you with headaches, and obvious errors of ocular functions are detected, such as to entitle one to assume that their correction may lead to some beneficial result, and after the operation your patient steadily recovers from the malady which has pursued him for ten or twenty years, surely it is fair then to assume that at least your result was due to the therapeutic measures you adopted.

KINGDON (Nottingham) and RISIEN RUSSELL (London). Infantile Cerebral Degeneration, with Symmetrical Changes at the Macula. *Transactions Royal Medico-Chirurgical Society of London, vol. lxxx.*, 1897.

Instances of this rare disease were first recorded by Waren Tay in 1881 (*Ophthalmic Society's Transactions*); since that date, according to the list given by Kingdon and Russell, ten additional papers on the subject have been published, including a second communication by Tay.

The paper now before us contains clinical records of four cases, three of them under the observation of the authors; its value is greatly enhanced by the addition of the *post-mortem* findings in three cases, in one of which the pathological examination has been carried out very thoroughly. In only one of the previously reported cases are there notes of an autopsy, and in that the examination was limited to the brain.

Kingdon and Russell's cases afford a good illustration of the tendency this disease exhibits to attack more than one member of a family. There were seven children, four of whom are known to have been the subject of this malady, and another child was almost certainly affected.

(1) Male, died aged 2 years. Not seen by the writers, but was almost certainly affected.

(2) Female, healthy.

(3) Male, died, aged 12 months (*Case 1 in the paper*).

(4) Male, healthy.

(5) Female, died aged 20 months (*Case 2*).

(6) Male, died aged 18 months (*Case 3*).

(7) Male, living, aged 8 months. Has characteristic ocular changes and general symptoms.

The fourth case, of which notes are given, was under the care of Dr. F. J. Smith at the London Hospital, and presented the usual manifestations of the disease, dying when fourteen months of age. No *post-mortem* examination could be obtained.

The general description of the disease in its clinical

aspects, given by the authors, is based on a study of the recorded cases in conjunction with those contained in their paper ; the account of the *post-mortem* conditions is derived from the examination of two cases under Kingdon's care.

As the disease is very uncommon, and the records of it scattered, and also because the report by Kingdon and Russell is the most complete that has yet appeared, it seems desirable to give the authors' observations in some detail.

Etiology.—No distinct exciting cause is known, and the disease has no apparent relation to syphilis or other hereditary taint, or to consanguinity of marriage. Racial peculiarity appears to have some influence ; of the published cases, all in which there is a statement as to nationality have been Jews. Both sexes are liable ; of nineteen cases in which the sex is given there were eight males and eleven females.

Symptoms and Progress.—The authors give three stages of the disease.

First Stage.—The child, probably born at full term, shows no symptoms of disease until about the end of the third month. Then some weakness of the muscles of the back and neck is observed, and the child is believed to see badly. On ophthalmoscopic examination definite and characteristic appearances are discovered. These consist of symmetrical changes at the macula lutea, in which situation is a whitish grey patch, nearly twice the size of the optic disc, slightly raised above the general surface of the retina, oval in shape, with softened edges. A few retinal vessels are visible on it at its periphery. In the centre of the patch is seen the fovea as a dark red spot (see author's illustration and Tay's coloured drawing, plate 3, vol. i., *Ophthalmic Society's Transactions*).

The optic papilla at this date shows no decided changes, but later there is well-marked optic atrophy and blindness. The changes at the macula, however, remain unaltered from the date of their appearance till the close of life. That they are not congenital is proved by an observation by Tay, and by examination of the author's second case at the age of three months.

Second Stage.—The child is unable to sit up and its head falls backwards if unsupported ; when lying on its back it is unable to turn on to either side. It grasps objects very feebly, and is apathetic, taking no notice of its surroundings. Vision is reduced to perception of light, but the sense of hearing is acute and remains so during life.

Third Stage.—Atrophy of the enfeebled muscles ensues, and soon those of the whole body are involved. The child becomes very emaciated. The deep reflexes are exaggerated, and later rigidity of the extremities and retraction of the head become prominent features. Convulsions have been noted in one or two instances during the course of the disease, but they are not the rule.

Duration of Life.—This varies from one and a half to two and a half years, but is usually less than two years. All the subjects of this disease are known to have died except two, and they were becoming worse when last seen.

Morbid Anatomy.—Degeneration of the neurons of the cerebral cortex is the fundamental change in these cases ; and the evidence is all in favour of this being a primary degeneration of the nerve elements. It is, moreover, a progressive change.

With such alterations in the cortex it is not surprising that there should be degeneration of the fibres of the corona radiata, and of the pyramidal tracts throughout their whole course through the pons, medulla and spinal cord.

The other tracts in which degenerative changes are found are the fillet, the descending root of the fifth nerve, and the superior cerebellar peduncles, the affection being symmetrical on the two sides.

Examination of the eyes showed that the retina in the macular region was much thickened from enlargement of the outer molecular layer, the tissue of which was spaced out ; the change was most marked near the fovea, diminishing towards the periphery of the macular area.

The other layers of the retina appeared normal, and no changes were visible in it except at the yellow spot.

The optic nerve was atrophied, with over-growth of interstitial connective tissue, and a large increase in the

number of round cells in the nerve. No inflammatory exudation was found between the dural and pial sheaths.

The authors' conclusions as to the pathology of this remarkable disease are very briefly as follows :

The changes in the central nervous system confirm the clinical evidence that the disease is not congenital. No sign of congenital defect was found in any part of the nervous system examined. There is very little doubt that the changes in the pyramidal tracts are the result of, and occur later than, the degeneration of the pyramidal cells of the cortex cerebri, and the clinical evidence is in favour of this sequence.

The degeneration of the direct pyramidal tracts corresponds exactly with that found in the crossed pyramidal tracts.

No lesion of the posterior column nuclei being present, the change met with in the fillet must be looked upon as a descending degeneration ; the same conclusion applies to the degeneration of the descending root of the fifth nerve, and to the superior cerebellar peduncles.

The relationship of the ocular changes to those of the central nervous system is not very evident ; this statement, however, applies more to the changes at the macula than to the atrophy of the optic nerve, this latter condition being frequently associated with degenerative changes of the central nervous system.

The optic nerve atrophy must be looked upon as a primary degeneration.

With regard to the changes in the retina, it is difficult to understand why the outer molecular layer should be especially affected. It is possible that the changes are due primarily to degeneration of the ganglion cells of the retina, similar to that found in the pyramidal cells of the cerebral cortex.

Probably the optic nerve atrophy and the retinal changes are both dependent on a common cause, related to the changes in the brain ; this view, however, cannot be considered as more than a probability.

The paper is illustrated by photographs, chiefly of the microscopic appearances of the affected tissues.

J. B. L.

H. SNELLEN (Utrecht). Erythropsia. *Graefe's Archiv., vol. xliv., pt. i.*, 1897.

Snellen here propounds a theory of the nature of erythropsia which is both simple and ingenious. He points out that Fuchs' well-known view of its dependence on the retinal purple is not a complete explanation of all the facts, as indeed Fuchs himself allows : it does not, for example, account for the complementary *green* vision which frequently precedes the red ; the fact that the purple is confined to the outer segments of the rods renders it difficult to understand how its colour affects the percipient retinal elements ; and finally the purple is absent from the yellow spot, although in some cases at any rate the red vision is as intense in the centre of the field as elsewhere. Snellen therefore looks for another explanation, and finds it in certain well-known phenomena of contrast and afterimage.

His theory may be best explained by quoting the experiment which he has designed to illustrate it. Taking a sheet of red-tinted gelatine with a central hole 3 mm. in diameter, and looking through this at the clear sky, the field of vision appears at first colourless in the centre, while the periphery is coloured by the red light transmitted by the gelatine. Gradually, however, the centre takes on a greenish hue from the effect of contrast. If now the gelatine be removed and the eye directed towards a moderately lighted surface the colours are reversed in the afterimage and the central part of the field exhibits typical erythropsia. Similar conditions, says Snellen, are present when the eyes are exposed to the glare of a snow-field ; the strong light penetrating the eyelids and the vascular coats of the eye itself illuminates the periphery of the field with a red glow, such as one sees through one's fingers on holding them up to the sunshine ; the centre is at the same time lighted by white light through the pupil. On passing into the comparative darkness of the hut the negative after-image is developed, and all objects seen with the centre of the field appear red.

Interesting as this explanation is, it seems evident that it too does not cover the whole ground. Probably we must infer that the phenomenon which we are seeking to explain is not really a single one; that is to say, that more than one group of clinical conditions may express itself by erythropsia as its most striking subjective symptom.

W. G. Laws.

H. SCHMIDT (Aix-la-Chapelle). Enucleation with Movable Artificial Eye. *Klin. Monatsbl. f. Augenheilk., November*, 1897, *p.* 383.

The author points out that of the various surgical proceedings which have been practised as substitutes for simple enucleation of the eye, with the object of obviating the immobility and sunken position of the artificial eye, none have proved capable of giving so complete an immunity from the risk of sympathetic ophthalmitis as is obtained by enucleation. He advocates a perfecting of the operation of enucleation with especial regard to the mobility and position of the artificial eye, rather than the substitution for it of any less safe proceeding.

In certain exceptional cases the mobility of the artificial eye is satisfactory even after a simple enucleation, and this is manifestly due to the connection between the muscles and the conjunctival base on which the eye rests being more complete than usual. The author attributes this exceptional condition to previous inflammation, which has established a more than usual connection between tendons and conjunctiva. Whether he is correct in this view is open to question. We fancy that the cases which give the best results in this respect are those in which the surgeon has been especially careful to avoid any unnecessary separation of the conjunctiva and Tenon's capsule

from the tendons at the time of the operation. Be this as it may, his idea is to ensure a firm connection between the tendons and conjunctiva by means of sutures. His method, the description of which is somewhat difficult to understand, appears to be essentially as follows. The conjunctiva being divided all round the cornea, and undermined to the extent of about 1 cm., each rectus tendon in turn is seized with the forceps, incised without being completely divided, and secured by means of a catgut suture passed through it. This being done the tendons are completely divided close to their insertions. A slit is now made in the conjunctiva (in a meridional direction ?) over the middle of each muscle. The enucleation being then completed, each tendon is sutured into the corresponding slit in the conjunctiva, and the latter is drawn together and united by a continuous suture, giving a vertical and horizontal line of sutures forming a cross, to the four extremities of which the four tendons are united. The result is said to be a considerable advantage as regards the mobility of the artificial eye and a diminished degree of sinking.

P. S.

E. A. NESNAMOFF (Charkow). The Treatment of Trachoma with Solutions of Iodine. *Centralblatt für praktische Augenheilkunde*, *August*, 1897.

The preliminary notice regarding the results obtained by the author from his system of treatment of trachoma by solutions of iodine appeared in 1895, and since that time he has pursued the treatment at his own clinique and at that of Leber in Heidelberg, employing as solvents white vaseline oil, ether, and glycerine, and the good effects have been most marked. For example, at the author's suggestion, Prof. Leber employed a solution in vaseline oil in the treatment of cases of acute trachoma ; the patients were taken into hospital

and treated with no other remedy, first weaker and then more powerful ·solutions of iodine alone being employed. In the short time of from two to three weeks results were obtained which can only be described as really excellent, and patients with most marked follicular trachoma of both lids were sent home completely cured.

Jakowleff also reports excellent results from the use of iodine dissolved in white vaseline oil ; he thus treated sixteen cases of various types of trachoma, and in every instance with much benefit ; the trachomatous follicles were quickly absorbed, the old scars became softer, and began to resemble normal tissue. Fortified by these good results Jakowleff has extended his use of the treatment ; he rubs over the affected areas of conjunctiva a piece of wool soaked in a solution of the strength of 1 per cent. in early stages—a stronger solution in later stages. He has not one failure to record. Out of 144 men (Jakowleff is a military surgeon) affected with the disease, it had completely disappeared in 50 who had been under treatment for only so short a time as about four months, and in all the others there was much improvement. He comes to the following conclusions therefore :—(1) Every form of trachoma may be cured by the persistent use of iodine dissolved in vaseline ; (2) trachomatous pannus is also cured by it ; (3) the stronger solutions ought not to be used daily, as they are so active and cause so much irritation ; (4) the scars left by the disease are so altered by the application that they excite no corneal irritation or inflammation ; they become covered with finely vascularised conjunctiva ; (5) the treatment is effective not in true trachoma alone, but in all forms of disease of the conjunctiva in which there is extensive overgrowth of papillæ.

Certain observers, however, have obtained results not so satisfactory, a fact which Nesnamoff believes may be explained either by the solution not being properly prepared, or by the fear of injury to the eye by the use of a remedy whose value is still unproved, causing them to apply the treatment less vigorously, or by lack of patience

to await the result. Thus one surgeon used for a time without much effect, except to cause considerable discomfort to the patient, a solution of only $\frac{1}{2}$ per cent.; others drop into the conjunctival sac the weakest solution without consideration as to the actual state of the lids, suiting the remedy to the stage of the disease, or making sure that the really affected portion is exposed to the action of the drug; others, again, fail to persevere for a long enough period.

Nesnamoff therefore considers it advisable to lay down the principles upon which the iodine treatment ought to be used. Iodine, as every one knows, specially exhibits its absorbent action upon lymphoid elements; one sees this exemplified in the case of enlarged lymphatic glands and in diseases of the mucous membrane of the throat, &c.; and, in addition, iodine is a powerful antiseptic. The application of iodine in the form of tincture, containing as it does 90 per cent. of pure alcohol, in cases of conjunctival disease is dangerous to the cornea, which would be liable to suffer from the spirit; ether, on account of its volatility, is an inconvenient solvent. The best solvents for iodine with which it enters into no chemical combination are glycerine and white vaseline oil; the latter of these penetrates tissue well and causes no irritation. Iodine is soluble in either of these up to $1\frac{1}{2}$ per cent.; but one may increase its solubility by mixing alcohol with the glycerine or ether with the oil. Since iodine, ether, and spirit are all volatile, the solution does not keep well more than about a week; it should be placed in a dark and well-stoppered vessel.

In making choice as to concentration of the solution to be employed there are certain points to bear in mind, in particular the exact type and stage of the disease, the varying degree of sensibility of the conjunctiva, and the end to be aimed at considering the degree of pathological change which has already taken place.

The essential element in trachoma is, as is well recognised, the lymphoid infiltration of the adenoid tissue of the conjunctiva, with the formation of follicles, which

form themselves into a network, and each of which is enclosed in a well-defined capsule; the contents in process of time necrose, and are absorbed without leaving any scar. The scars are only the result of the inflammation of the mucous membrane, which may be set up by the presence of the follicle. That the original cause of all these changes is bacterial does not, in Nesnamoff's opinion, admit of doubt; the micro-organisms, which find themselves in a congenial medium, multiply quickly, and produce in some cases a rapid development of lymph follicles which penetrate the tissue; in other cases a slow development of these follicles, with hyperplasia of papillæ, and destruction of the epithelium by the invading leucocytes. Pannus is simply a similar development of these follicles, along with formation of new blood vessels in the sub-epithelial layer of the cornea. Precisely similar appearances are presented by the conjunctiva in the condition known as follicular catarrh, a condition probably due to the same cause, and which is merely an early stage of trachoma. The pathological changes which are observed in folliculosis conjunctivæ are, for the most part, heaping up of lymphoid elements in discrete elevations on the surface of the conjunctiva, while the other portions of this tissue remain intact. The condition leads to no formation of scars, and passes off without leaving any trace.

It is, however, not always easy to distinguish clinically between a folliculosis produced by atropine or by spasm of accommodation or uncorrected hypermetropia, from that of an early stage of granular conjunctivitis, and for this reason it is never safe to leave such a doubtful condition untreated; on the contrary, one ought to aim at the same goal as in the treatment of trachoma, viz., the absorption of the newly-formed pathological products. The use of iodine in such cases gives excellent results; in two or three weeks the follicles all disappear, and the membrane regains its normal aspect; if it is softened and pours out much sticky secretion it is best to begin the treatment with a $\frac{1}{2}$ per cent. solution in glycerine, for the glycerine readily mixes itself with the mucous secretion and obtains access

thus more readily for the iodine to act directly upon the affected tissue. After one or two applications the conjunctiva becomes less moist and the reaction is not so violent ; the author recommends then a 1 per cent. solution in vaseline oil, the conjunctiva being first dried with cotton wool ; in a very obstinate case of folliculosis, a solution of $1\frac{1}{2}$ per cent. may be employed.

It is in a similar way that cases of true trachoma are treated. The upper lid, if it be chiefly affected, is everted, and while the cornea is protected the ointment is smeared on a few times with a pad of wool ; if much reaction follows it should be taken as an indication to employ more careful drying of the conjunctiva before the application is made. After the ointment is smeared on, the lid should not be replaced, but held everted until (in a moment or two) the yellow or brown discoloration of the conjunctiva has disappeared, so that no free iodine may come in contact with the cornea. If it does so there is an abundant flow of tears, and the sodium chloride of the tears interferes with the action of the remedy. These applications ought to be made daily or twice a day ; and if the pain be not severe it is well to raise the strength of the solution to 3 or even 4 per cent., adding sufficient ether to keep the iodine in solution.

The presence of a catarrh in a case of dry chronic trachoma is no bar to the use of iodine, rather the contrary, for then most quickly will the absorption of the newly-formed follicles occur. As the follicles begin to subside and be absorbed, the conjunctiva will become smoother and more glistening, and the so-called brawny trachoma of Stellwag will come to be the condition. In this stage of the disease the instillation of a 2 to 3 per cent. solution should be employed until the conjunctiva becomes thin and transparent, and shows vascularisation ; the strength ought then to be reduced and the patient go on with the treatment at home.

In the fresh follicular cases treated in this way, and if there be no scarring, one may look for complete *restitutio ad integrum* after a period varying from three weeks to

32

three months according to the severity of the original disease. In the cases of papillary trachoma with loss of epithelium, with hypertrophy of papillæ, and vascular alterations, where the conjunctiva is covered with warty granulations, and where the tarsus is thickened, prognosis is less satisfactory both as regards completeness of recovery and time required, but for all that the results are good. Use of a 2 or 3 per cent. solution leads frequently to a shrinking of the individual papillæ, the conjunctiva becomes smoothed down and more velvety. In such cases pannus and ulcers of the cornea are common, but do not hinder the application of treatment ; on the contrary, the pannus disappears quickly under iodine, the ulcers clear up, the superficial opacities become less marked, and vision improves. Of course in more severe affection of the cornea, or when the iris is involved, atropine must be used ; pannus completely covering the whole cornea, however, is very amenable to treatment by iodine.

In the papillary variety of trachoma, where scar formation has already begun, it is obviously hopeless to look for a complete cure ; one ought, however, to endeavour to free those portions of the conjunctiva in which there are as yet no scars from the pathological conditions which give rise to them, an end which, in Nesmanoff's opinion, is not attained by expression or any other of the methods in ordinary use. But persistent application for three or four months of a 2 to 3 per cent. solution of iodine gives good results. The conjunctiva became smooth, the scarring minimal, the tarsus remained intact and the cornea healthy in every case throughout a considerable series. Even in cases in which much of the membrane was degenerated and only showed healthy islands here and there which rose above the general level, and by rubbing the cornea were apt to produce pannus and ulceration, relatively great improvement in the state of the eye was brought about by the like treatment. In such cases if the lid can be everted a $\frac{1}{2}$ per cent. solution should be rubbed in, if not, a 1 per cent. solution should be dropped into the sac.

The iodine solution should *not* be used when trachoma

is in the inflammatory stage, with the conjunctiva swollen and œdematous, with much hyperæmia and lacrymation ; but the treatment should be at once begun when the acute condition begins to pass off, and such cases react quickly to judicious application.

The author has never seen any ill effects or much pain result from the use of a 4 to 5 per cent. solution, and concludes that it is quite safe to allow the patient to employ a 1 to 2 per cent. solution at home, should daily attendance upon the surgeon be impossible. It should be borne in mind that the mere dropping in of the solution is vastly less effective than its direct application to the lids, on account of the protecting action of the tears. He concludes by adding that he has found the direct injection of his solution into the lacrymal sac when in a state of chronic inflammation to be a most efficient mode of treatment.

W. G. Sym.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Mr. H. R. Swanzy, President, in the Chair.
Thursday, December 9, 1897. Clinical Evening.

Foreign Bodies lodged in the Eye and Orbit. — Mr. Hartridge showed a case of leaden pellet lodged in the eye, with skiagraph. The patient was shot in the right eye by a pellet from an air gun. When seen two hours after the accident there was a large linear wound of the cornea with prolapse of the iris and hæmorrhage into the anterior chamber. There was no perception of

light. Tension — I. The prolapsed iris was cut off. Two days later, after the blood in the anterior chamber had cleared up, it was found that the lens was wounded. A skiagraph was taken, the plate being placed on the right side of the head and the Crookes's tube on the left so that the X-rays passed through the head from left to right. The exposure was fifteen minutes. The result showed that the pellet was lodged about the middle of the orbit. The eye was excised as it was obviously lost, and the pellet was found lodged in the globe.

Mr. J. F. Bullar also showed a skiagraph of a fragment of a percussion cap in the orbit.

Mules's Operation for Ptosis.—Mr. W. J. Cant and Mr. A. S. Morton each showed a case of ptosis treated by Mules's operation, which consists in the insertion of a wire loop from the free edge of the lid beneath the skin to the eyebrow. Mr. Cant's case was one of congenital ptosis of one eye. When the frontalis muscle was put into action the lid was raised by means of the loop so as to expose the pupil. Mr. Morton's case was one in which ptosis had been present in the right eye for twenty years and in the left eye for three years. Referring to the difficulty of tightening the suture Mr. Morton had had a communication from Mr. Mules in which the latter said he used silver wire as stout as the lid would carry, and before using it he heated it in a spirit lamp to make it less brittle. After inserting the suture from the free edge of the lid to above the eyebrow he allowed it to remain five or six days before tightening it. In order to tighten it the wire near the ends was grasped with lead-lined forceps while the ends were twisted. Mr. Morton had also heard from Dr. Tatham-Thompson of his experience which was entirely favourable. In one of his cases after two months' use a blow on the eye caused the wire to snap but the ptosis was not so bad as it had been before insertion of the suture, a certain amount of cicatrisation of the subcutaneous tissue of the lid having been set up.

Non-recurrent Orbital Sarcoma. — Mr. Morton showed a

case of non-recurrent orbital sarcoma. The patient had had a sarcoma extending from the upper outer part of the orbit to its apex. The whole of the contents of the orbit were removed and chloride of zinc paste was applied. After fourteen months there was no sign of recurrence.

Solid Œdema of the Conjunctiva. — Mr. Holmes Spicer showed a case of solid œdema of the conjunctiva. The patient was a woman, aged 21. The condition was present in the right eye only ; it was confined to the ocular conjunctiva ; it had been noticed for about three or four months. The only apparent cause was an obstruction to the return of lymph from the eye produced by suppuration and subsequent cicatrisation in the lymphatic glands of the neck two years before. On the affected side the preauricular and cervical glands had both suppurated, and on the other side the cervical glands only. There was no proptosis of the eye ; the vision was normal and the retina and its blood-vessels appeared normal. There was no sign of disease in the nasal passages.

The President thought the case was a very rare one.

Mr. Adams Frost thought it was similar to two cases shown at the Society some years before by Mr. Donald Gunn which were described as syphilitic infiltration of the conjunctiva. In those cases he thought the preauricular glands were also enlarged.

Mr. Silcock referred to a case which he had published in the *Transactions* of the Society similar to this one ; he had incised the conjunctiva and scraped granulation tissue from Tenon's capsule.

Mr. Eales spoke of a case of similar appearance which he had seen.

Traumatic Cyclitis.—Mr. Marshall showed a specimen of traumatic cyclitis, in which the injury had been caused by a piece of wood ; there was a dense cyclitic membrane dividing the eye into two cavities.

Specimens of Pseudo-glioma. — Mr. Marshall showed one specimen of pseudo-glioma, and Mr. Ernest Clarke another. In the former the child was seven weeks old,

there was a white mass seen behind the lens, and the tension of the eye was raised. After excision the case was found to be one of pseudo-glioma. Mr. Clarke's case was one of bilateral pseudo-glioma, in which there was a record of pseudo-glioma occurring in two other members of the family.

Mr. Treacher Collins said that he would have been inclined, apart from the family history, to have regarded this as a case of congenital membrane in the vitreous.

Secondary Sarcoma of the Orbit.—Mr. Ridley showed a case of secondary sarcoma of the orbit. There were all the signs of a tumour of the orbit, and there were also tumours of the scalp of the supra-spinous fossa and of one fibula.

Chip of Steel in the Vitreous for Eighteen Months. -- Mr. Laws showed a patient with a chip of steel in the vitreous which had been there for eighteen months. There was no sign of irritation ; the foreign body in the vitreous was encapsuled ; there were several red streaks on the lens and fine red particles all over the surface of the lens ; the lens remained clear for fifteen months but had slowly become opaque in its posterior parts.

Perforating Wound of the Eyeball.— Dr. Brailey showed a case of perforating wound of eyeball. The patient's right eye had been struck by a piece of wood. There had been a wound of the cornea and prolapse of the iris ; the prolapse had been removed. Without any apparent cause the vision of the other eye, which had remained quite good for two months and a half, was beginning to deteriorate and had fallen from $\frac{6}{6}$ to $\frac{6}{15}$. There was no sign of sympathetic inflammation and nothing to account for the defect.

Recurrent Membranous Conjunctivitis.—Mr. Batten showed a case of recurrent membranous conjunctivitis. The membrane had been removed several times but always recurred ; it had the appearance of a superficial burn. The bacteriological examination had not been completed.